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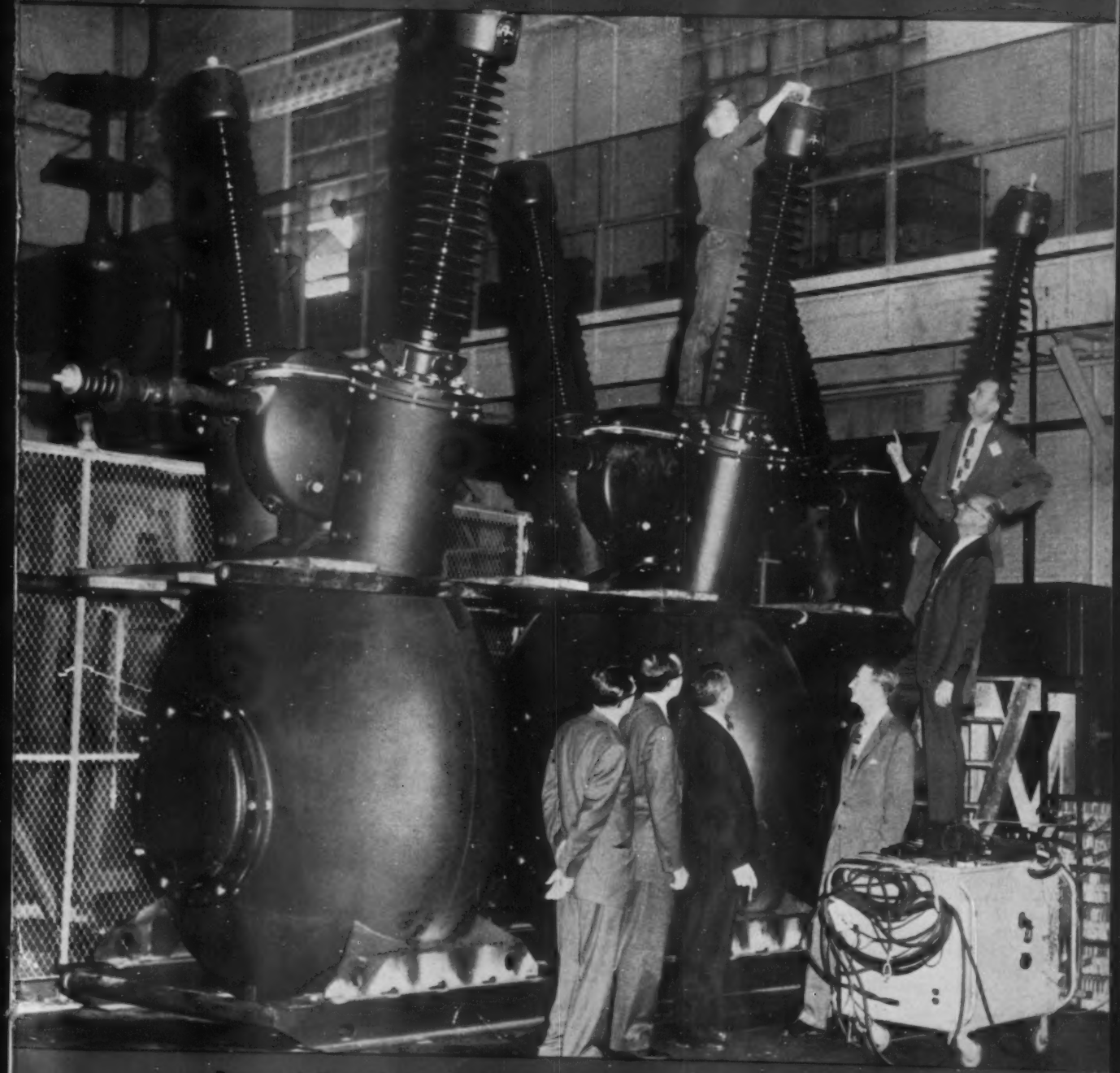
The Utility Engineering Section of this issue begins on page 67

APRIL 1958



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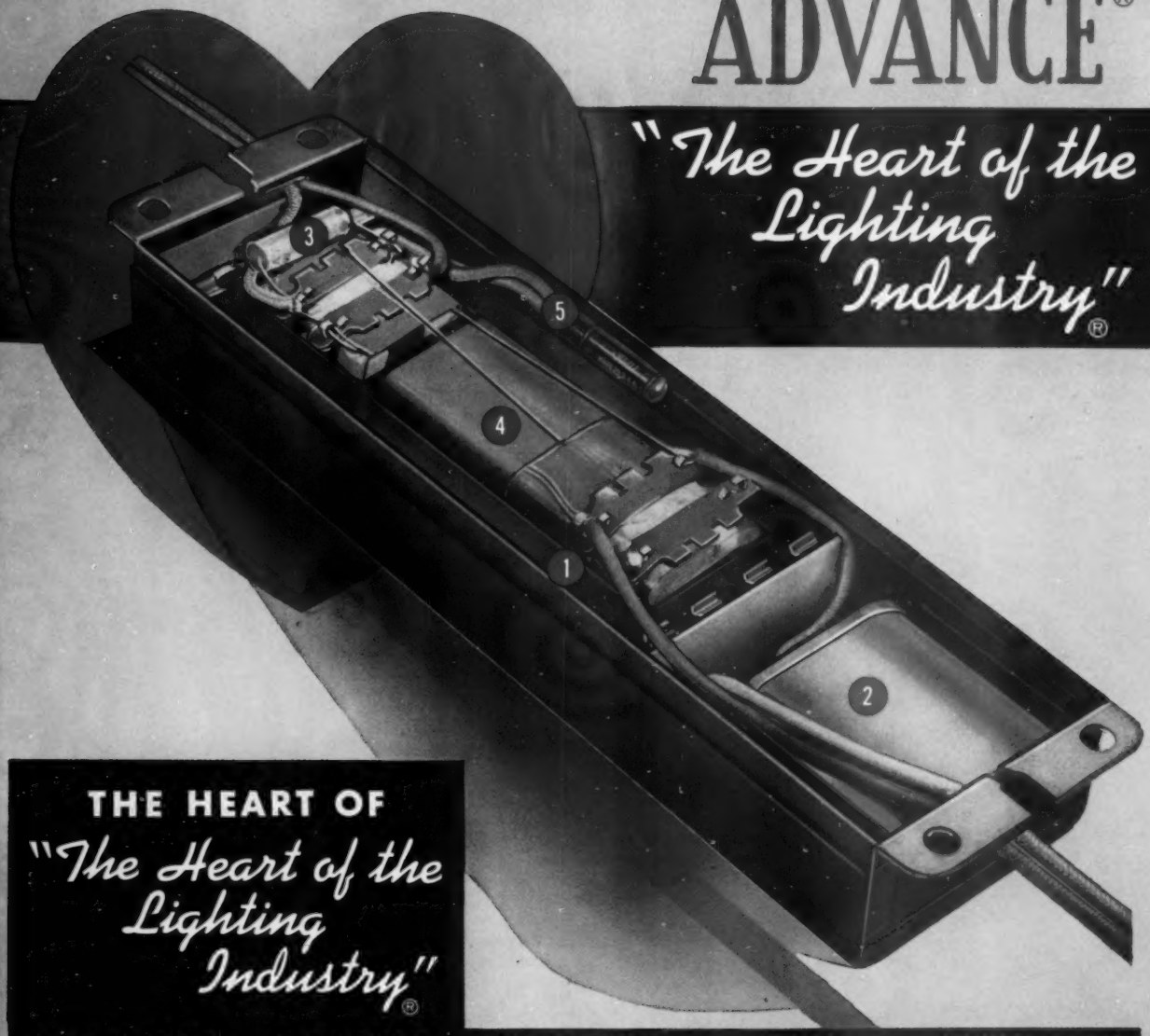

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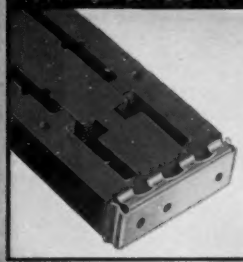				

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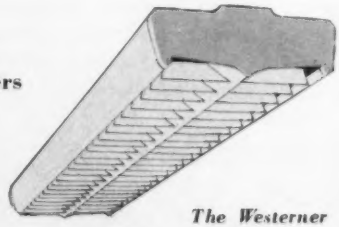

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Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Unemployment situation

The national economic picture has been overshadowed for the past few months by mounting worries over a gradually increasing unemployment condition. The same pessimism is found in the various economic regions of the nation although in varying degrees. There is no doubt but that the national picture is most disturbing, and that it sets the "norm" against which regional conditions can be measured.

Although the national scene now registers unemployment in excess of five million persons, certain regions find themselves not as seriously affected as such statistics might indicate. In the South, for example, data would indicate that the problem has not produced the serious situation that might be found elsewhere. There are many reasons for this result, but the most important seems to lie in the status of production efficiency.

It is quite easy to start a warm battle by claiming that Southern labor is more efficient or more productive (or both) over that of other regions of this nation. This report today does not intend to weigh the capabilities of any force against any other. But, the simple fact is that since many of the Southern industrial plants are relatively new, the modern and most automated equipment is in use.

Moreover, the labor supply has been more recently trained in industrial operation practices and thus, is more at home in a newer industrial operation. These two factors combine to provide an operating efficiency that reflects the most modern techniques of production available in most industrialized areas. Thus, it is to be expected that serious unemployment consequences may be felt last in such an area.

Of the entire Southern area, the portion most seriously affected by unemployment conditions, is the Southwest where a further problem is present (distance from concentrated markets). In this region, the added cost of distribution, small though it may be, seriously affects the sale of manufactured goods in a highly competitive marketing condition.

In spite of this condition, however, even this area should produce a quick return to production normalcy as soon as inventories have been reduced to rock-bottom. It is certain that the more efficient plants will get first call for return-to-work orders as soon as marketing conditions permit.

Trimming the fat

Industry has, during the past ten years, been guilty of mass hirings because of expanding economic conditions. Since many products could be sold effectively regardless of the costs involved, there has not been too great effort given over to personnel economy, although token consideration has been noted in the more efficient firms.

Now industry has a great opportunity to examine personnel at all levels to determine the practical fitness of the man for the job. Moreover, many tasks are being examined for possible elimination or modification for economy's sake. This situation will undoubtedly increase the unemployment rolls to a certain extent, but the very fact that all phases of the business operation are being reviewed will tend to ensure more economical and efficient operations.

Long-range results of this program may, after a period of readjustment, lead into a more stable and efficient industrial picture.

There may be some persons who will argue that the present time is not the best to trim payrolls, and that a lot of recession talk is spurred by industry's cost cutting attitude. This may be true, but on the other hand, in a competitive economy some readjustments are always necessary to keep a product on the market in strong competitive condition.

No industry can afford to maintain personnel on the employment rolls if they do not produce, either in more goods or lower costs or better market position. Such revisions in personnel policy as are felt on the current market can increase the operating strength of industry generally.

Basis of comparison

It is confusing to many and certainly unfair to compare unemployment today with that of 1940 or even 1948-49. Industrial employment has increased steadily over the years as has the total employed work force of the nation. The fact that over five million persons are currently unemployed does not mean that such a figure is as severe as it was during other depressed periods.

Because of the unprecedented prosperity of the recent past years, employment has risen to figures in the neighborhood of sixty-seven million people. Thus, a five million unemployment figure still leaves a very heavy amount of employment at extremely high wages and salaries.

Such a statement affords little consolation to the man without a job, but it does promote a salient fact about our present economic scene. Unless a severe psychological scare affects the buying habits of the presently employed, there should be ample consumer spending to soon relieve the inventory adjustment period that industry is now going through. Then, production can be re-established on sound schedules that should provide realistic and expanding employment for those who desire to work.

Industry, facing either heavy wage demands or shorter working time in the next round of labor negotiations, recognizes that higher labor costs must be accompanied by greater production or the prosperous period cannot be re-established on a sound and lasting basis.

Some labor groups have yet to recognize that higher wages with no increase in productivity can do nothing except to promote more unwelcome inflation. Perhaps the employment pruning of the present may drive this fact home with clarity to those who want "something for nothing."

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

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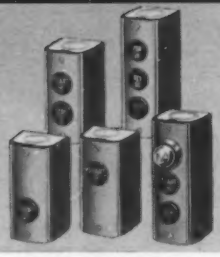

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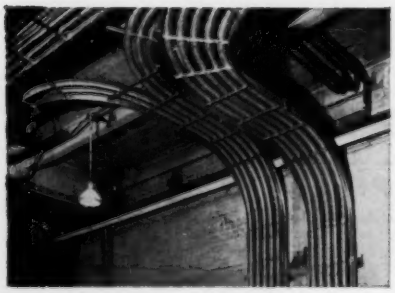

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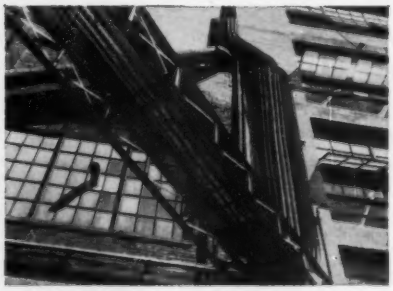

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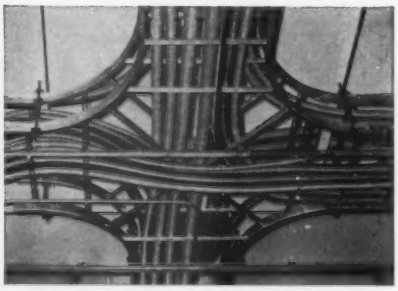
You reduce cost of vertical supports with Nepco-Lok. More convolutions mean more gripping surface for internal contact between cable and armor . . . reduces number of vertical supports needed per foot of cable.



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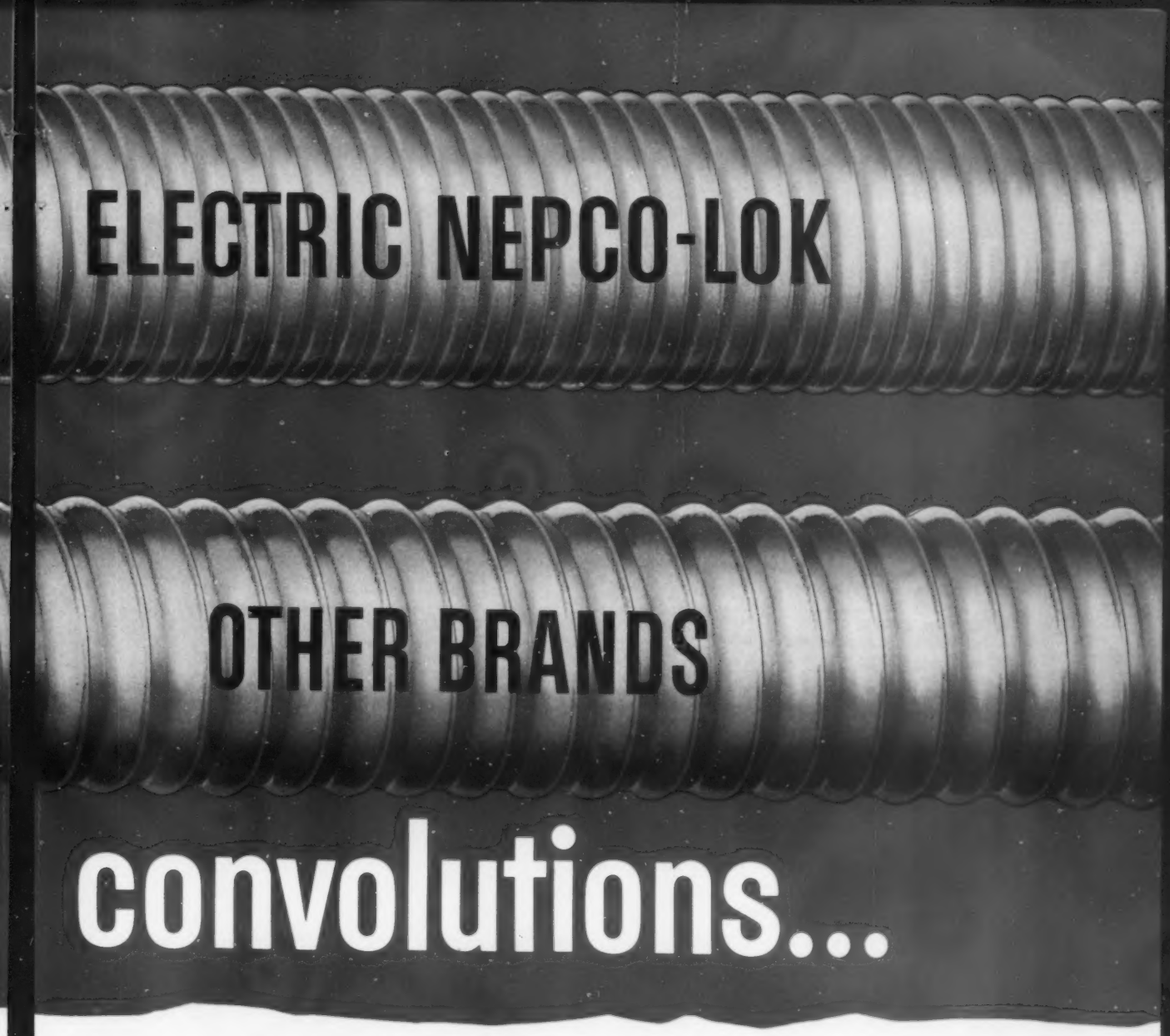

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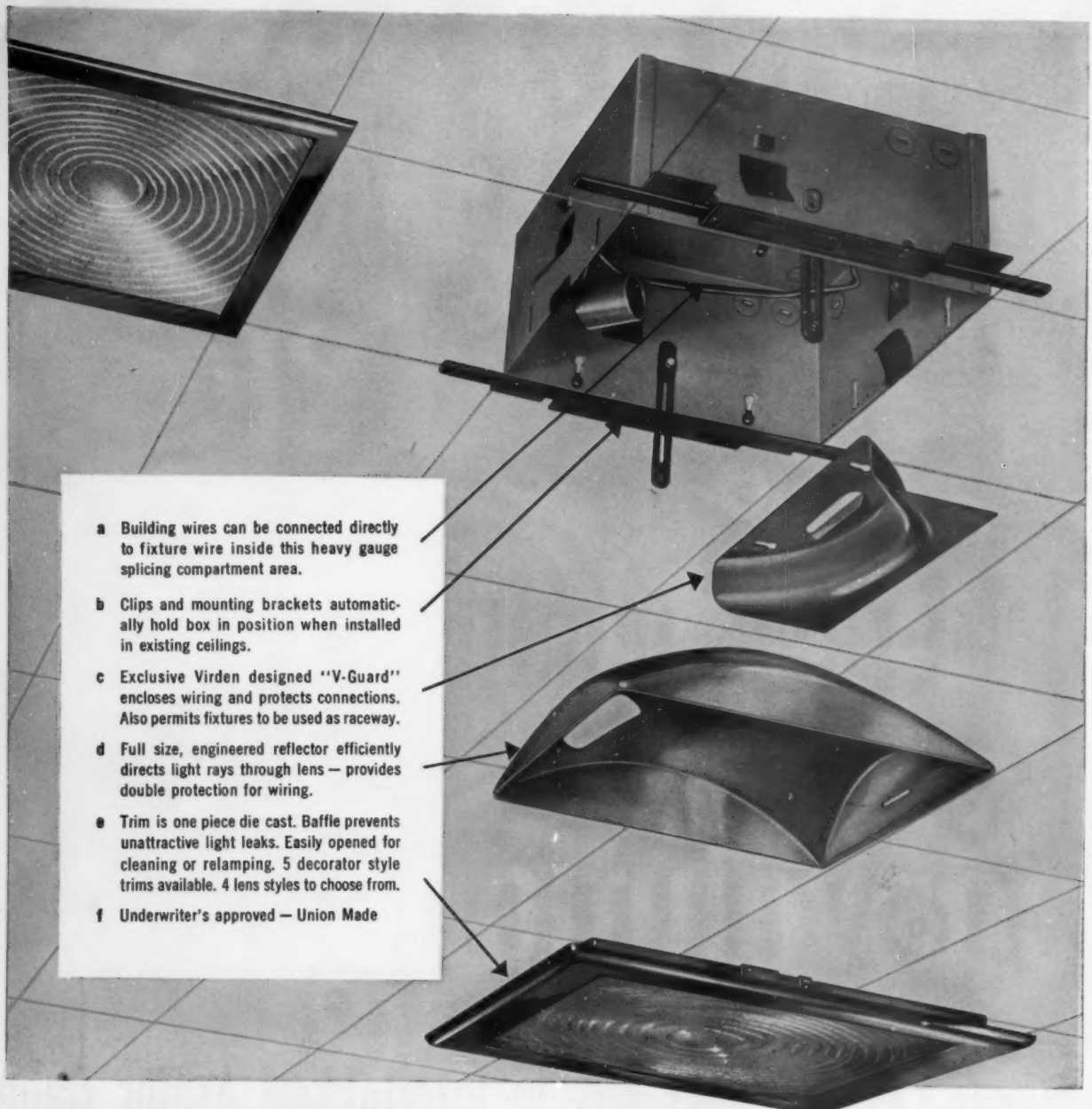

a Building wires can be connected directly to fixture wire inside this heavy gauge splicing compartment area.

b Clips and mounting brackets automatically hold box in position when installed in existing ceilings.

c Exclusive Virden designed "V-Guard" encloses wiring and protects connections. Also permits fixtures to be used as raceway.

d Full size, engineered reflector efficiently directs light rays through lens — provides double protection for wiring.

e Trim is one piece die cast. Baffle prevents unattractive light leaks. Easily opened for cleaning or relamping. 5 decorator style trims available. 4 lens styles to choose from.

f Underwriter's approved — Union Made

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In 3 sizes — 75 watts, 100 watts and 150 watts — the unit features a one-piece die cast trim, baffled to eliminate light leaks. Five trim finishes with four lens styles provide a wide range of decorative lighting possibilities, both indoors and out.

Use this new Virden fixture on your next lighting job. See for yourself how much easier it is to install, the wiring time it saves. Your Virden distributor has these new fixtures in stock now. Order yours today.

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1086—Cable Connectors
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1088—Fittings and Fixtures
A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg. Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1092—Electrical Boxes
Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 33, Pa., offers a catalog of their complete line.

1136—Space Heating Guide
Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples.

1166—Electrical Fittings
A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1190—Electrical Fittings
Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.

1192—Wire Pulling Lubricant
Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 4145 W. 150th St., Cleveland 11, Ohio.

1214—General Catalog
General catalog of Royal Electric Corporation, Pawtucket, R. I. covering flexible, service and lamp cords, cord sets, extensions, trouble lights, wiring devices and fuses is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1218—Carbon Products
A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes, grade recommendations, characteristics, and description of brush grades, is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.

1224—Electrical Equipment
The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches, Service Equipment, Distribution Panels and "E-Z-RED" Circuit Breakers.

1230—Compression Connectors
An illustrated 18-page bulletin (13A) describes Squeezon compression connectors for all overhead distribution connections from line wire to ground rod. Offered by James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., the bulletin also describes the mechanical and hydraulic installation tools required and tells where to use each.

1238—Selecting Fuses
A 12-page descriptive handbook "Fuseology" tells how to get safest most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses—how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

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April, 1958

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(Print Plainly)

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Circle numbers below. Bulletins and catalogs will be mailed promptly.

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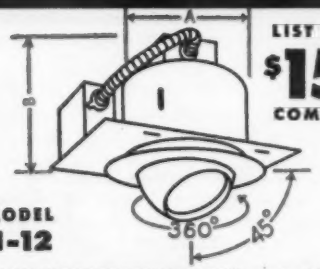
introducing

"Mini-Sphere" by HALO

WORLD'S TINIEST RECESSED ADJUSTABLE SPHERE



LIST PRICE
$15.95
COMPLETE

MODEL
H-12

"MINI-SPHERE" PERMITS 360° swivel with 45° vertical adjustment. Available with prewired or unwired housing. "Rough-in" dimensions (A) 6¾" diameter, (B) 6¾" depth. Standard finishes. Satin Chrome and Satin Brass. Packaged complete one per carton. Order bar hangers separately.

ORDERING INFORMATION

CAT. NO.	DESCRIPTION	PRICE
H-12	PREWIRED (one complete per carton)	$15.95
H-12O	UNWIRED (one complete per carton)	14.40
HB2	HANGER BARS (12 sets per carton)	0.50

Specify Finish: SATIN CHROME—SC SATIN BRASS—SB

Tiny "MINI-SPHERE"—designed principally for residential applications. Small physical size permits multiple or single use without cluttering the ceiling.

APPLICATIONS:

"MINI-SPHERE" is designed for use with New 30-Watt R20 Reflector Lamp
Overall Length 3¾".
Diameter 2½".
TINY—POWERFUL—COOL

WRITE FOR COMPLETE HALO CATALOG AND PRICE INFORMATION

HALO LIGHTING PRODUCTS COMPANY

2104 NORTH ORCHARD . CHICAGO 14, ILLINOIS
MOhawk 4-2970

CAT. NO. 1251-I
15 amps., 120-277 volts
Single Pole A.C. "Presswitch"
with thru-connection
and ivorine nylon button.

Truly velvet in performance . . . "Presswitch" responds to the gentlest press of the finger, touch of the hand or nudge of the elbow. It's the smoothest, most convenient and most efficient A.C. switch in Hubbell's famous family of switches.

"Presswitch" is designed for all general A.C. applications, particularly the control of large fluorescent lighting applications. It is as much at home in a factory as in a living room, for its attractive styling blends with any interior and its rugged precision-molded construction represents a new standard of durability and dependable operation.

"Presswitch" fits standard wall boxes, accommodates standard wall plates and operates in any position. It requires no special wiring.

Complete information is yours on request.

Cat. No.	Type	Button Style
1251	Single Pole with thru-connection	Brown Nylon
1251-I	Single Pole with thru-connection	Ivorine Nylon
1252	Double Pole	Brown Nylon
1252-I	Double Pole	Ivorine Nylon
1253	Three-way	Brown Nylon
1253-I	Three-way	Ivorine Nylon
1254	Four-way	Brown Nylon
1254-I	Four-way	Ivorine Nylon

HARVEY HUBBELL, INC.

HIGHEST QUALITY
WIRING DEVICES • MACHINE SCREWS

DEPT. R-2 BRIDGEPORT 2, CONNECTICUT

WIRING DEVICE OFFICE AND WAREHOUSE LOCATIONS

Bridgeport 2, Connecticut
State and Bostwick Streets

Chicago 7, Illinois
37 South Sangamon Street

Los Angeles 12, California
103 North Santa Fe Avenue

San Francisco, California
1675 Hudson Avenue

Dallas 7, Texas
1111 Dragon Street

IN CANADA:
Scarborough, Ontario
1160 Birchmount Road

Enter Code Numbers of Catalogs Desired on Coupon on Page 10

1240—Lighting Fixtures

Prescolite Manufacturing Corp., 2229 Fourth St., Berkeley 10, Calif., now has available a 36 page color catalog, No. 31-F, describing their complete line of lighting fixtures including recessed series and accessories, surface series and accessories, exit light, and aisle lights. Dimensional drawings are shown for each fixture.

1244—New Electrical Fittings Catalog

Concise 36-page catalog illustrates and describes a complete line of electrical fittings, cable racks and wiring specialties. The catalog contains many detail drawings, clear-cut photographic illustrations of mast fittings, cable connectors, straps, hangers and ground clamps in a wide variety of types and sizes. For your free copy, write The M. & W. Electric Mfg. Co., East Palestine, Ohio.

1250—Electrical Enclosures

Catalog No. 5354 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga., is a well-organized, compact 94-page manual giving complete descriptive information, prices, and specifications on all items in the B & C line of electrical enclosures. Copies are available free of charge to electrical contractors.

1254—Construction Anchors

"Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

1266—Metal-Clad Switchgear

Detailed information on metal-clad switchgear is now available in two special bulletins, 700-B and 7004-C. These booklets give descriptions, application data and specifications on units up to 15 kv and 500,000 kva interrupting capacity. Wire I-T-E Circuit Breaker Co., 19th and Hamilton St., Philadelphia 30, Pa.

DIAMOND PORTABLE CORDS
in RED-D-Prene® and BLACK DIAMOND

Portable cords for mill and plant use designed with tough, oil-resistant Type MD* (Mill Duty) neoprene sheath in either Industrial Red for ready identification or durable Black Diamond.

DIAMOND DTW
Small Diameter Building Wire

Flame and moisture resistant, Diamond DTW is thermoplastic insulated. Its small size lets you add additional circuits in existing conduits. Eight permanent colors. UL approved.

DIAMOND DTX®
Non-Metallic White Sheathed Cable

Non-sticking, smooth and easy to pull, Diamond DTX will not flake off. Moisture and flame resistant, it is clean to handle and strips easy.

DIAMOND TYPE SE Service Entrance Cable (Armored and Unarmored)

May be used without conduit from pole to building and down side of building in places not subject to mechanical injury. Listed by Underwriter's Laboratory.

DIAMOND DUF® TYPE UF

Thermoplastic insulated and jacketed non-metallic sheathed cable. Retards flame and has excellent resistance to moisture, corrosion, fungus, abrasion. Listed by UL.

DIAMOND ABC Armored Bushed Cable

Flexible steel armored cable ideally suited for general lighting and wiring in non-fireproof homes. Two, three or four conductor.

DIAMOND RANGE CORD SET

Diamond three-wire range cord sets are 36" long. Have rubber molded cap, molded on rubber jacketed cable—are complete with steel strain relief. UL approved.

...known for Reliability in Performance and Delivery!

Diamond Wire Products are accepted as being the best in the industry. A continuing program of production control, research and product development helps maintain this reputation. And when your order for a Diamond product comes in . . . the goods go out, promptly and with no delay.

DIAMOND
WIRE AND CABLE COMPANY
Sycamore, Illinois
Birmingham, Alabama

UP TO 49% $AVINGS
on materials alone
with
Fine Fanner Superformed
FANNGRIPS
FOR DEAD-ENDING GUY STRANDS

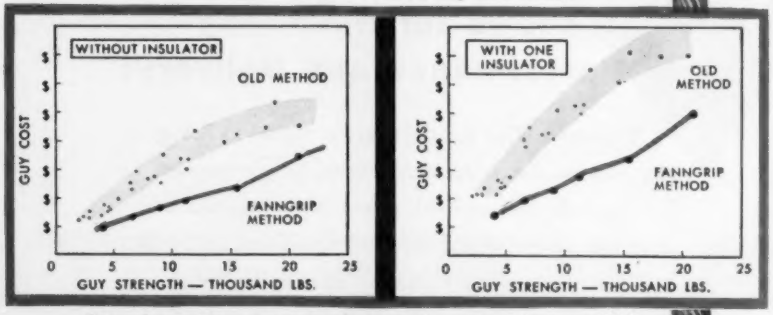
Old style costly methods are eliminated by the use of Fanngrips.

Now . . . costs compiled from typical guying methods using Fanner Fanngrips in comparison to other types of gripping devices show savings up to 49% *in materials alone* . . . in addition to the tremendous savings in time and labor!

Now . . . when savings are so important . . . here is more reason than ever to take advantage of the many Fanngrip features offered by no other type of gripping device:

- Provide maximum strand strengths.
- Eliminate laborious field fabrication.
- Self-clamping, permanently tight.
- Heavy coatings protect from corrosion.
- Do not damage guy strand surfaces.
- Dangerous and wasteful strand ends eliminated.
- Available in "B" or "C" coated galvanized steel, or copperweld.

Ask for cost-saving data today!



Two of a series of graphs demonstrating the savings available through Fanngrips over ordinary gripping methods.

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AGENTS and DISTRIBUTORS IN PRINCIPAL CITIES

ARMOR RODS · LINEGUARDS · TAP ARMOR · PATCH RODS · FANNGRIPS
PLASTIC FANNGUARDS · PLASTIC INSULATING TUBINGS AND MOLDINGS

Enter Code Numbers of Catalogs Desired on Coupon on Page 10

1268—Lighting Fixtures

The Perfeclite Co., 1457 East 40th Street, Cleveland 3, Ohio, makes available the following literature: (1) Data Folder 54-B — 4 pages of engineering information, prices and specifications on Plastic Indirect Concentric Ring Luminaires. (2) Data Folder EX-57 — 10 pages of information on Exit Units for all building locations. Complete Engineering data and prices given. (3) Data Folder 56-A — Information on Ceiling Pan Fixtures and Vapor Proof Prismatic Exterior Fixtures. (4) Data Folder 58-A on Concrete Mounting Boxes for recessed incandescent units. (5) Data Folder 58-B on Fluorescent Exit Units. (6) Data Folder 58-C on Phosphorescent Exit Units. (7) Data Folder 57-A on extra shallow recessed units and square ceiling pans.

1300—Lighting Control Switch

The Arrow-Hart and Hegeman Electric Co., 103 Hawthorn St., Hartford 6, Conn., offers a one page information sheet on their new quiet, tap action, lighting control switch, designed to fit any standard toggle wall plate.

1302—F. Lamp Maintenance

An informative folder on Fluorescent Lamp Trouble Shooting is offered by Champion Lamp Works, Lynn, Mass. It features an illustrated trouble shooting check chart. The Champion Lamp Works also has available a helpful slide rule on lamp application, covering incandescent, regular fluorescent, and slimline lamps.

1306—Fasco Fans

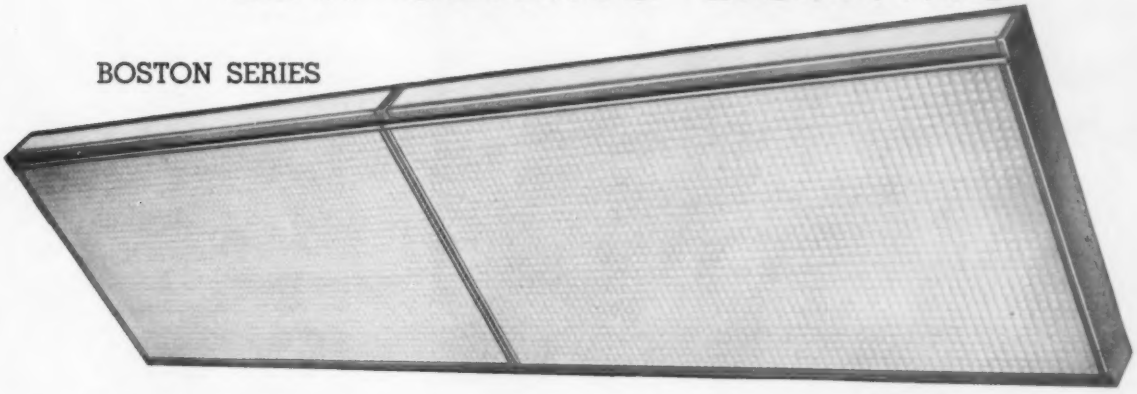
Fasco Industries, Inc., North Union and Augusta Sts., Rochester 2, New York offers two 8-page catalogs; one describing their window, hassock and oscillating fans, and the other describing their ventilating fans.

1308—Cable Spinners

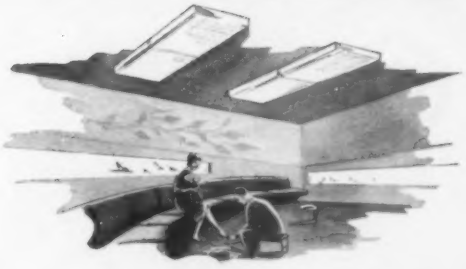
A complete data file on aerial cable spinners and tools is available from Cable Spinning Equipment Co., 3100 Topeka Blvd., Topeka, Kansas. The file includes reprints of pertinent articles, operating instruction book, and

EASTERN...for high-styled LOW-CEILING LIGHTING

BOSTON SERIES

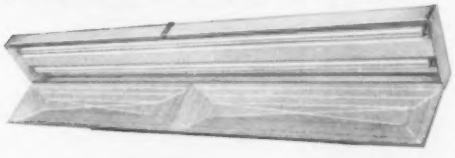


Rigidly-framed plastic sides distinguish this trim, smart-looking style. Shallow unit is hinged at both sides. Plastic cannot curl or warp.



BROOKLINE SERIES

Clean-cut modern design plus economy. All plastic sides. Louvre is completely framed and hinged at both sides.



Surface Mounting *with a Recessed Look*

2 OUTSTANDING NEW ACHIEVEMENTS BY EASTERN — the distinctive Boston and Brookline series — with egg-crate louvre or vinyl plastic lens. Modern in design, built with care and precision, both units are less than 4" deep, combine shadowless, low brightness lighting with economy. Full top reflector provides peak lighting efficiency. Economical to install and maintain. Louvres lower for easy relamping. Available for surfacing mounting and continuous row installations. Send coupon today.

Eastern FIXTURE COMPANY
170 Vernon St., Boston 20, Mass.

EASTERN FIXTURE COMPANY
170 Vernon St., Boston 20, Mass.

Please send me complete information on your new Boston and Brookline series.

NAME _____

ADDRESS _____

CITY _____

STATE _____

new!

3-wire 30 amp LEV-O-LOCK Flush Outlet and Cap

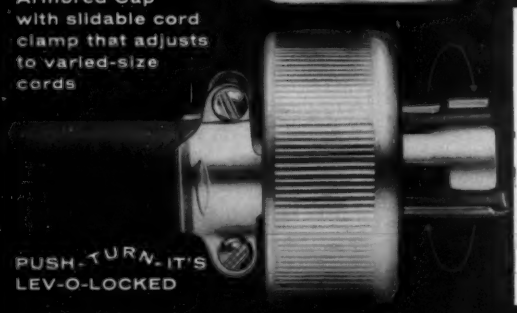
The complete LEV-O-LOCK line of Specification (5000) Grade devices provides safe, dependable connections under severest conditions of vibration, motion or accidental pull-out.

SPECIFICATION GRADE

No. 5181
Single Flush Outlet

SPECIFICATION GRADE

No. 5180
Armored Cap
with slidable cord
clamp that adjusts
to varied-size
cords



PUSH-TURN-IT'S LEV-O-LOCKED

Can be wired for outdoor use in FS and FD type boxes accommodating 1⅝" weatherproof hinged plate or for Industrial use in Standard switch boxes.

For Industrial Plants, Office Equipment, Trailer Camps, Ships, Dryers in the Home, or Wherever the Code Requires 30 Amp Service. Here is the first 30 Amp outlet to fit standard outlet box covers.

Meet Underwriters' Laboratories and Federal Specifications

your best jobs are done with . . .

LEVITON MANUFACTURING COMPANY, INC.
Brooklyn 22, N. Y.

LEVITON

Samples on request

Chicago • Los Angeles • Leviton (Canada) Limited, Montreal

For your wire needs, contact our subsidiary AMERICAN INSULATED WIRE CORP.

Enter Code Numbers of Catalogs Desired on Coupon on Page 10

1312—Killark Fittings

A new catalog section covers Killark plugs and receptacles in two basic designs: explosion-proof and weatherproof. This new line offers many advantageous features, and is available in many styles and sizes to fit various boxes. Killark Electric Mfg. Co., Easton and Vandeventer Ave., St. Louis, Mo.

1314—Wiring Equipment

Keystone Manufacturing Co., 23328 Sherwood Road, Center Line, Mich., has issued a new catalog (158 March 1, 1958) giving complete specifications and illustrations on their line of wiring installation equipment. Included in the 70-page catalog are wireways and auxiliary fittings, cutout boxes, outlet boxes, switch boxes, and cabinets, giving Code requirements, and price sheets.

1316—Electric Heating

Electramode Division of Commercial Controls Corp., 570 Culver Rd., Rochester 3, N. Y., is now offering their new catalog EC-199 describing a complete line of electric heaters and heating systems for the home. Descriptions, specifications and illustrations are included for wall and portable heaters for large and small rooms, radiant panel heaters, baseboard heaters and radiant cable heat.

1318—Power Bender

The lightweight hydraulic power bender #884, manufactured by Greenlee Tool Co., of Rockford, Ill., is described in a new bulletin issued by the company.

1320—Bending Equipment

A concise eight-page brochure has been made available from Tal Bending Equipment, Inc., 417 N. Water St., Milwaukee 2, Wis., describing their "One Shot" bender line. The Tal bender uses the same frame for standard pipe, copper tubing, radiant heat coils, rigid and thinwall conduit, bus bar, flat, round or square stock—from ⅜ to eight inches.

1322—Fuse Links

Complete information—application, coordination, interchangeability— of fuse links is given in **Fuse Links and How to Use Them,** published by the A. B. Chance Company of Centralia, Missouri. This free 23-page manual includes a packet of standard-time-current-characteristic curves in a back-cover pocket.

INSULDUR

a major breakthrough in insulation for all Westinghouse pole-type distribution transformers

Only the Insuldur system gives your distribution transformers the ability to live longer. This patented process makes practical further increases in distribution loads without endangering normal service life or permits longer life with present loading.

YOU CAN BE SURE...IF IT'S

Westinghouse

here is what the

INSULDUR®

system is:

A product of Westinghouse research that will protect major . . . layer . . . and turn-to-turn insulation in pole-type distribution transformers. The basic components that make this possible are:

- Inhibited oil
- New high-temperature enameled wire
- Insuldur insulation

These three basic factors comprise the Insuldur system—available only in Westinghouse distribution transformers.

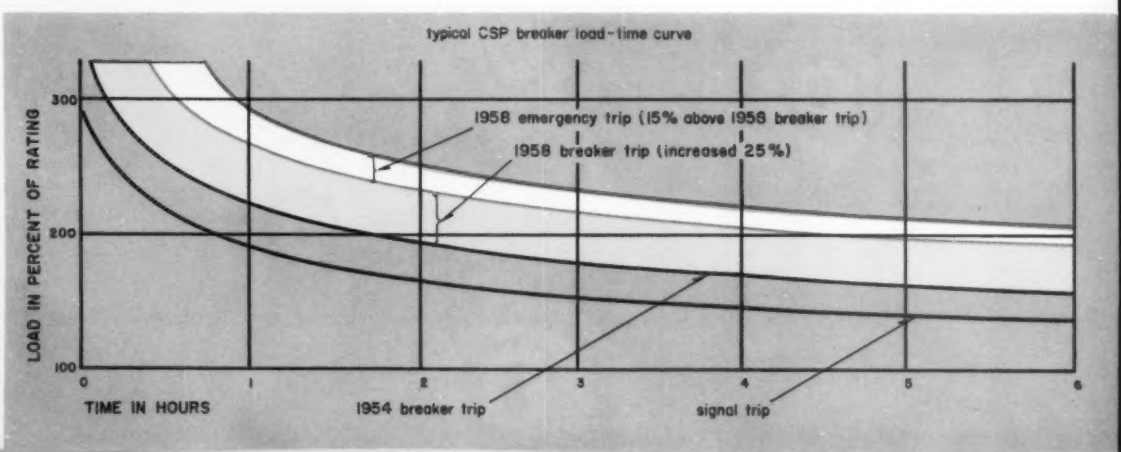
here is what the

INSULDUR

system does:

It allows the operating temperature to be raised 25% above the 1954 Westinghouse distribution transformer—without sacrifice of normal service life. This means that you can . . .

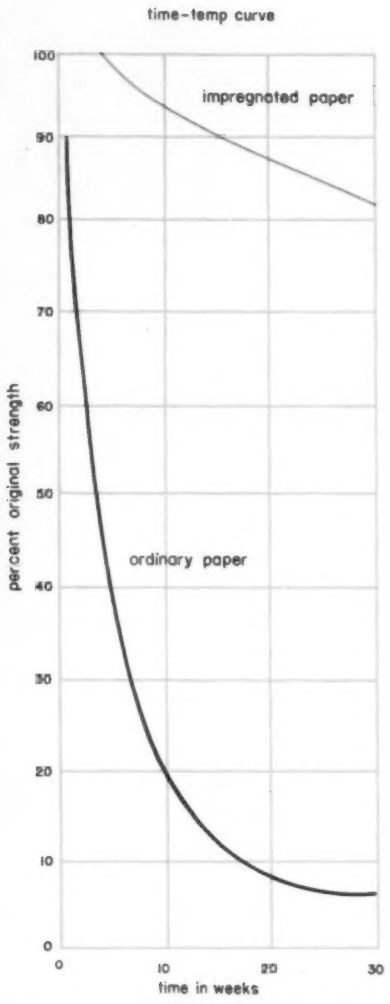
- load transformers heavier with the same life expectancy
- or increase life expectancy while maintaining present loading practice



and here is proof:

INSULDUR "stays alive"

when other insulations char, crumble and "die"



Aging-rate curves of ordinary paper and the Insuldur paper. The extra resistance to aging shown in these results proves the Insuldur system 10 times stronger.

Visual inspection shows that insulation from an ordinary transformer has darkened and tended to carbonize from the effects of service aging. The insulation from an Insuldur-protected transformer shows little change due to the combination of heat, moisture, oil and mechanical stress.

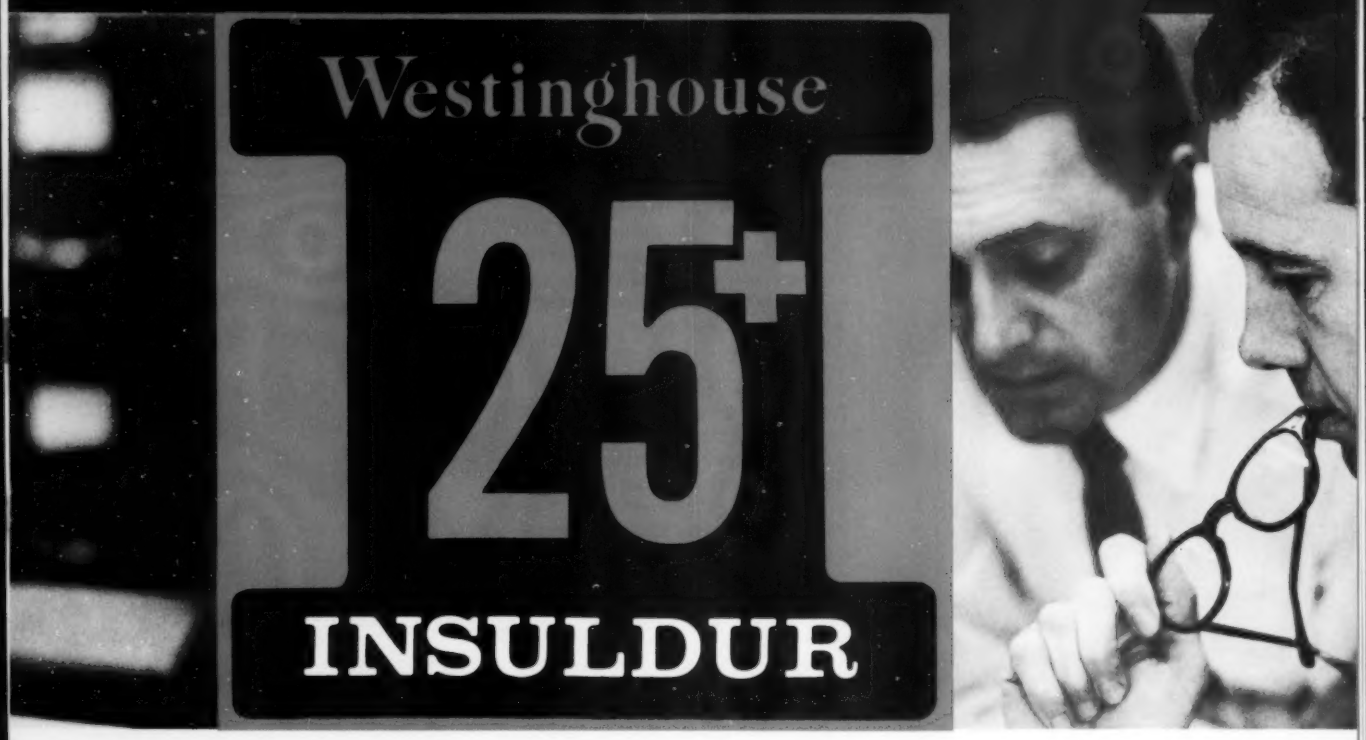
The "Crumble Test" offers proof that transformers not protected by the Insuldur system are in danger of having their service life shortened. Here is proof, too, of the extra life built into every Insuldur-protected transformer.

Here the ordinary insulation has "died," while Insuldur insulation has sprung back, full of life. This means that under conditions such as short circuits in actual transformer service, ordinary insulation—and the transformer itself—could "die" . . . but the Insuldur-protected transformer would continue to live.

TRY IT! Perform the "Crumble Test" yourself . . . compare the resistance to service aging exhibited by Insuldur insulation with the breakdown of ordinary insulation. Call your Westinghouse representative . . . he will be glad to supply you with samples of both, so that you can prove for yourself the amazing durability of Insuldur insulation.

INSULDUR*

protected transformers are identified by the big "I"



*another improvement in distribution transformers created by PLOWBACK of earnings into research

Again, in the creation of Insuldur, Westinghouse leadership in distribution transformer development is maintained by plowing back earnings into research—pure and applied . . . into design and development engineering . . . into test facilities. That's why Westinghouse distribution transformers bring you tomorrow's performance—today!

J-70843-R-4

YOU CAN BE SURE...IF IT'S Westinghouse

ELECTRICAL ASSOCIATION DIRECTORY FOR THE SOUTH AND SOUTHWEST

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Electrical Clearing House of Louisville, Inc. W. D. Roach, Secretary-Treasurer, 731 W. Ormsby Ave., Louisville 3, Ky.

Electrical Association of New Orleans. E. H. Mowen, Secretary, 921 Union St., New Orleans, La.

Peninsula Electrical Association. J. Russell Hopkins, Secretary, c/o Central Electrical Supply Co., Salisbury, Md.

The Electric Association of Kansas City. John S. McDermott, Executive Manager, Merchandise Mart Bldg., Kansas City 8, Mo.

St. Louis Electrical Board of Trade. Don E. Rosenthal, Secretary-Manager, 1221 Locust St., St. Louis 3, Mo.

Electric League of Chattanooga. Paul J. McMillian, Secretary, Sixth and Market Sts., Chattanooga 2, Tenn.

Texas Electrical Association. D. O. Clem, Secretary-Treasurer, P. O. Box 1454, Houston 1, Texas.

Electrical League of Norfolk. C. R. Hegamyer, Secretary-Treasurer, P. O. Box 605, Norfolk 1, Va.

Electrical Association of Richmond. C. F. Bennett, Executive Secretary, 205 West Grace St., Richmond 20, Va.

The Electric League of Charleston. Guilford C. Smith, Secretary-Treasurer, c/o Appalachian Electric Power Co., P. O. Box 1986, Charleston 27, W. Va.

Central West Virginia Electrical League, Inc. J. R. Waters, Secretary, P. O. Box 1392, Fairmont, W. Va.

UTILITIES

Southeastern Electric Exchange. John W. Talley, Managing Director, 303 Haas-Howell Bldg., Atlanta, Ga.

The Maryland Utilities Association. Robert L. Smith, Secretary, Frederick, Md.

Oklahoma Utilities Association. Miss Thelma T. Jones, Secretary, Suite 2416, Oklahoma Biltmore Hotel, Oklahoma City 2, Okla.

Public Utilities Association of the Virginias. R. W. McKinnon, Executive Secretary, 602 First Federal Bldg., Roanoke, Va.

WHOLESALERS

Southeastern Electrical Wholesalers Association. M. L. Tice, Executive Vice-President, P. O. Box 176, Ben Hill, Ga.

National Association of Electrical Distributors. Arthur W. Hooper, Executive Director, 290 Madison Ave., New York 17, N. Y.

REPRESENTATIVES

Southeastern Electrical Manufacturers Representatives Club. Frank P. Bell, Secretary-Treasurer, 806 Peachtree St. NW., Atlanta 3, Ga.

Electrical Equipment Representatives Association. Cy W. Sward, Executive Director, 1675 Fifth St., Clermont, Fla.

Electrical Manufacturers Representatives Association, Inc. George E. Clements, Secretary, 722 Stevenson Lane, Towson 4, Md.

Electrical Manufacturers' Representatives of Virginia, Inc. C. F. Bennett, Secretary, 205 West Grace St., Richmond 20, Va.

CONTRACTORS

Florida Association of Electrical Contractors. L. L. Dick, State Manager, 620 Stovall Professional Bldg., Tampa 2, Fla.

Association of Independent Electrical Contractors. R. E. Neumann, Secretary, 704 Frenchmen St., New Orleans 16, La.

Electrical Contractors Association of Maryland. Charles L. Greer, Secretary-Treasurer, 404 North High St., Baltimore, Md.

Shelby County Electrical Contractors Assn. A. M. Scruggs, Sr., Corresponding Secretary, 58 Buntyn St., Memphis 11, Tenn.

Associated Independent Contractors of America. A. W. (Woody) Norwood, President, P. O. Box 4915, Dallas, Texas.

National Electrical Contractors Association. Clint J. Harder, Secretary-Treasurer, 1200 18th St., NW, Washington 6, D. C.

NECA, Birmingham Chapter. Ernest W. Weir, Manager, P. O. Box 1781, Birmingham, Ala.

NECA, Gulf Coast Chapter. Frank M. Hawkins, Manager, 402 St. Michael St., Box 1003, Mobile, Ala.

NECA, Central Alabama Chapter. G. E. Thomason, Manager, 3516 Princess Ann St., Montgomery, Ala.

NECA, Arkansas Chapter. Carl E. Harris, Manager, 202 National Old Line Bldg., Little Rock, Ark.

NECA, Washington, D. C. Chapter. Harry W. Kellams, Manager, 910 17th St., NW, Washington 6, D. C.

NECA, Florida East Coast Chapter. J. H. Jackson, Manager, 519—25th St., West Palm Beach, Fla.

NECA, North Florida Chapter. W. S. Binckley, Manager, P. O. Box 3172, Jacksonville, Fla.

NECA, South Florida Chapter. Charles J. Powers, Manager, 2526 W. Flagler St., Miami 35, Fla.

NECA, Atlanta Chapter. Andrew C. Hill, Manager, 4234-5 Atlanta National Bldg., 50 Whitehall St., Atlanta, Ga.

NECA, Southeastern Industrial Chapter. K. D. White, 946 W. Peachtree St., NW, Atlanta, Ga.

NECA, Southeastern Line Constructors Chapter. C. S. Thurber, Acting Manager, Candler Bldg., Rm. 231, Atlanta 3, Ga.

NECA, South Georgia Chapter. R. A. Kobs, Manager, 3208 Hamilton Rd., Columbus, Ga.

NECA, Kansas Chapter. Charles W. Paige, Manager, 416 Central Bldg., Topeka, Kan.

NECA, Central Kentucky Chapter. W. M. Schuemann, Manager, 2550 Southview Dr., Lexington, Ky.

NECA, Louisville Chapter. J. C. Snyder, Manager, P. O. Box 1685, Louisville 8, Ky.

NECA, Southwest Louisiana Chapter. Herman T. Vallery, P. O. Box 5584, Drew Station, Lake Charles, La.

NECA, South Louisiana Chapter. Michael Elgutter, Manager, 831 St. Peter St., New Orleans 16, La.

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NECA, North Louisiana Chapter. F. J. Evans, Manager, 753 Dalzell St., P. O. Box 1210, Shreveport, La.

NECA, Maryland Chapter. Robert L. Higgins, Manager, American National Bldg., Room 305, 204 North Liberty St., Baltimore 1, Md.

NECA, Central Mississippi Chapter. John C. Sullivan, Manager, 970 Milner Bldg., Jackson, Miss.

NECA, Greater Kansas City Chapter. Phil A. Koury, Manager, 2201 Grand Ave., Kansas City 8, Mo.

NECA, St. Louis Chapter. R. E. Vierheller, Manager, 4657 Hampton Ave., St. Louis 9, Mo.

NECA, Carolinas Chapter. D. L. Casey, Manager, P. O. Box 4056, Charlotte 4, N. C.

NECA, Western Oklahoma Chapter. Tom M. Rushing, Manager, 616 N.W. 5th St., Oklahoma City 3, Okla.

NECA, East Oklahoma Chapter. Johnny G. Hicks, Manager, 1519 S. Boston, Tulsa, Okla.

NECA, East Tennessee Chapter. Catherine S. McDonald, Acting Manager, 1007 James Bldg., Chattanooga 2, Tenn.

NECA, Knoxville Chapter. W. G. Hoffman, 312 West Jackson Ave., Knoxville 24, Tenn.

NECA, Memphis Chapter. Raymond Calhoun, Manager, 170 Nell St., Memphis 12, Tenn.

NECA, Nashville Chapter. B. V. Lawson, Manager, 1509 Laurel St., Nashville 4, Tenn.

NECA, Panhandle Chapter. John H. Burt, Manager, P. O. Box 2283, Amarillo, Tex.

NECA, Central Texas Chapter. N. E. Busby, Manager, P. O. Box 881, Austin, Tex.

NECA, Texas Gulf Coast Chapter. Ray P. Hayes, Manager, P. O. Box 2049, Corpus Christi, Tex.

NECA, Northeast Texas Chapter. L. E. Martin, Manager, 1923 McKinney Ave., Dallas 1, Tex.

NECA, El Paso Chapter. John E. Blaine, Manager, 310 San Francisco St., El Paso, Tex.

NECA, North Texas Chapter. C. E. Wann, Manager, Westchester House, Apt. 102, 554 South Summit, Fort Worth, Tex.

NECA, Southeast Texas Chapter. Charles Scholibo, Manager, 4218 Yoakum Blvd., Houston 6, Tex.

NECA, East Texas Chapter. Harry L. Wren, Manager, 412 Southwest Reserve Bldg., P. O. Box 1345, Longview, Texas.

NECA, West Texas-New Mexico Chapter. Aubrey E. Rummel, Manager, 105 College Ave., P. O. Box 121, Lubbock, Texas.

NECA, Heart of Texas Chapter. Fred E. Lewis, Jr., Manager, 1825 Austin Ave., Waco, Tex.

NECA, South Texas Chapter. Frank R. Stewart, Manager, 774 East Locust St., San Antonio 12, Tex.

NECA, Rio Grande Valley Chapter. R. N. Cummings, Manager, 607 West 4th St., Weslaco, Tex.

NECA, Virginia Chapter. Richard T. Smouse, Manager, 203 Roslyn Hills Dr., Richmond 26, Va.

NECA, West Virginia-Ohio Valley Chapter. Richard G. Dye, Manager, 510½ C St., South Charleston, W. Va.

INSPECTORS

International Association of Electrical Inspectors. Headquarters, Charles L. Smith, Secretary-treasurer, 612 N. Michigan Ave., Chicago 11, Ill.

IAEI, Alabama Chapter. Hugh Roberts, Secretary-Treasurer, Alabama Power Co., 2100 South 21st St., Birmingham, Ala.

IAEI, Florida Chapter. R. H. Wellwood, Secretary-Treasurer 2605 11th Ave., NW, Bradenton, Fla.

IAEI, Georgia Chapter. C. R. Minors, Secretary-Treasurer, P. O. Box 1719, Atlanta, Ga.

IAEI, Kentucky Chapter. E. H. Rueppel, Secretary-Treasurer, 201 Citizens Bldg., Louisville 2, Ky.

IAEI, George Weiman Chapter. J. Clifton Young, Secretary-Treasurer, 317 Baronne St., New Orleans 9, La.

IAEI, North Louisiana-East Texas Chapter. Kenneth D. Hightower, 1718½ Centenary Blvd., Shreveport, La.

IAEI, Mississippi Chapter. C. B. Grauer, Secretary-Treasurer, P. O. Box 1790 Jackson, Miss.

IAEI, Missouri-Kansas Chapter. T. McGinnis, Secretary-Treasurer, City Hall, Topeka, Kan.

IAEI, St. Louis Chapter. Neil W. Butteiger, Secretary-Treasurer, 7427 Canton Ave., University City 14, Mo.

IAEI, North Carolina Chapter. C. S. Whitaker, Secretary-Treasurer, City Hall, Durham, N. C.

IAEI, Oklahoma Chapter. T. C. Wier, 1907 W. 41st St., Tulsa, Okla.

IAEI, South Carolina Chapter. N. R. Darling, Secretary-Treasurer, P. O. Box 390, Columbia, S. C.

IAEI, Tennessee Chapter. R. E. Ward, Div. of Fire Prevention, 102 State Office Bldg., Nashville 3, Tenn.

IAEI, Texas Chapter. R. L. Payne, Secretary-Treasurer, 3303 Schley St., Dallas, Tex.

IAEI, Texas Gulf Coast Chapter. M. W. McRaven, Secretary-Treasurer, P. O. Box 1780, Houston 1, Tex.

IAEI, Southern Section. A. M. Miller, Secretary, 910 West 30th St., Richmond 25, Va.

IAEI, Virginia Chapter. A. M. Miller, Secretary, Treasurer, 910 West 30th St., Richmond 25, Va.

IAEI, West Virginia Chapter. H. L. Parks, Secretary-Treasurer, P. O. Box 626, Charleston, W. Va.

MOTOR REPAIR SHOPS

National Industrial Service Association, Inc. Joseph M. Harrington, Executive Secretary, 818 Olive St., St. Louis 1, Mo.

NISA, Southeastern Chapter. Mrs. Virginia Oehmann, Executive Secretary, 19 N. W. Fifth St., Fort Lauderdale, Fla.

NISA, Electric Motor Service Association of the District of Columbia. John W. Lainhart, Secretary, 913 E. St., NW, Washington 4, D. C.

NISA, Louisville Chapter. W. C. Krauth, Secretary, 118 S. 1st St. Louisville, Ky.

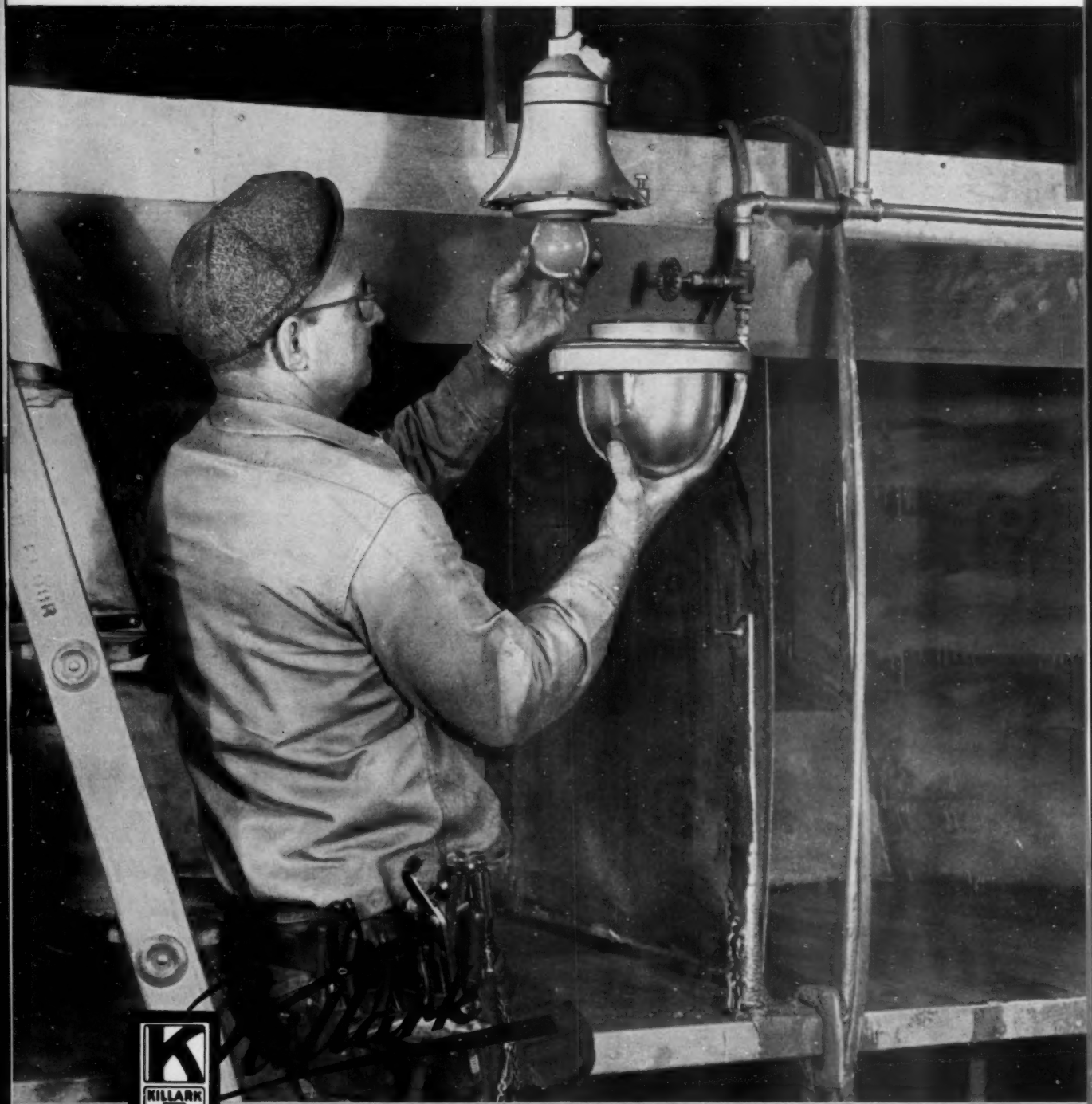
NISA, New Orleans Chapter. William Dreis, Secretary, 1517 Calliope St., New Orleans, La.

NISA, Mid-South Chapter. Murphy G. Miller, Secretary, 109 Jennings Ave., Knoxville 17, Tenn.

NISA, Southwestern Chapter. George Foshee, Secretary, 203 S. Main, Fort Worth 4, Tex.

NISA, Electric Club of West Virginia. O. E. Jenkins, Secretary c/o Guyan Machine Co., Logan, W. Va.

The "Man on the Ladder"
the complete line that offers



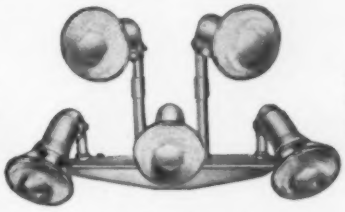
ELECTRIC MANUFACTURING COMPANY

ELECTROLET KILLARK SPEEDOLET

Vandeventer and Easton Aves. **St. Louis 13, Missouri**

talks about KILLARK fixtures
SELECTION...SAFETY...
PEAK EFFICIENCY...MODERN DESIGN

FOR HAZARDOUS LOCATIONS, from my experience, Killark Fixtures offer the ultimate for both my client and myself in dependable protection, better lighting and easier maintenance. Take this Explosion-Proof Fixture shown here, for example. You can see from the design how easy it is to relamp without tools. Wattage can be quickly changed on the spot, too, by a simple replacement of the adaptor. Snug-fitting, air-cooled aluminum body and shock-proof globe all mean on-the-job safety at all times.



FOR MY CLIENTS WHO WANT CLEAR, BRIGHT, CONTROLLED LIGHT, as for loading-dock or yard areas, I always suggest Killark Cluster-Lites. Their sealed Beam Lamps are adjustable in any direction, completely weatherproof, no reflectors to service. Rustproof aluminum offers years of uninterrupted service.

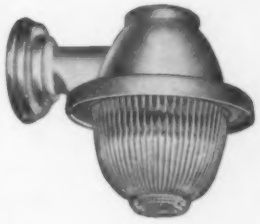
FOR "BEAUTY SPOT" AND HIGH-POWERED FLOOD LIGHTING, Killark also offers a complete selection of spotlights. They offer a powerful, compact source of light: flexible aiming, easy maintenance, minimum cleaning. The rustproof, non-staining aluminum design also assures cool operation for longer lamp life.

THE COMPLETE LINE OF KILLARK DUST-TIGHT FIXTURES boasts a graceful "ledge-free" design that prevents the dangerous accumulation of dust particles. Close-fitting lamp parts, carefully machined and skillfully assembled, positively exclude dust. Killark makes a complete series in ceiling, bracket and pendant styles.

THE KILLARK CONCH LIGHT is further proof that Killark brings you complete selection under one name. Here is subdued lighting at its dramatic best—attractively styled in gleaming, never-dulling aluminum and very effective for doorways, corridors and outdoor theatres.

VAPOR-TIGHT FIXTURES BY KILLARK are not only vapor-proofed inside but weather-proofed outside. They are made of never-rusting, non-corroding Alumalloy, a special Killark aluminum alloy. I know they can take any kind of climate or humidity, because I've installed them on docks, in railroad yards, underpasses and bridges and indoors in cold storage plants, breweries and dairies. They come large or small, too: from 60w to 500w sizes.

THIS NEW DEKORATIVE LIGHT is a handsome combination of weather-proofed lighting, plus sleek, streamlined beauty. It's tastefully styled in non-rusting, non-corroding Alumalloy (an exclusive with Killark) so that it's attractive for inside use, practical for outdoor use.



SALES OFFICES

Atlanta — Ernest T. Loyd, Inc., 69 Mills St., N. W.
Baltimore — Leo T. McCourt Co., 11 West 25th St.
Cincinnati — Arthur L. Ehlers Co., 1031 Meta Drive
Dallas — Geo. E. Anderson Co., 1901 Griffin St.

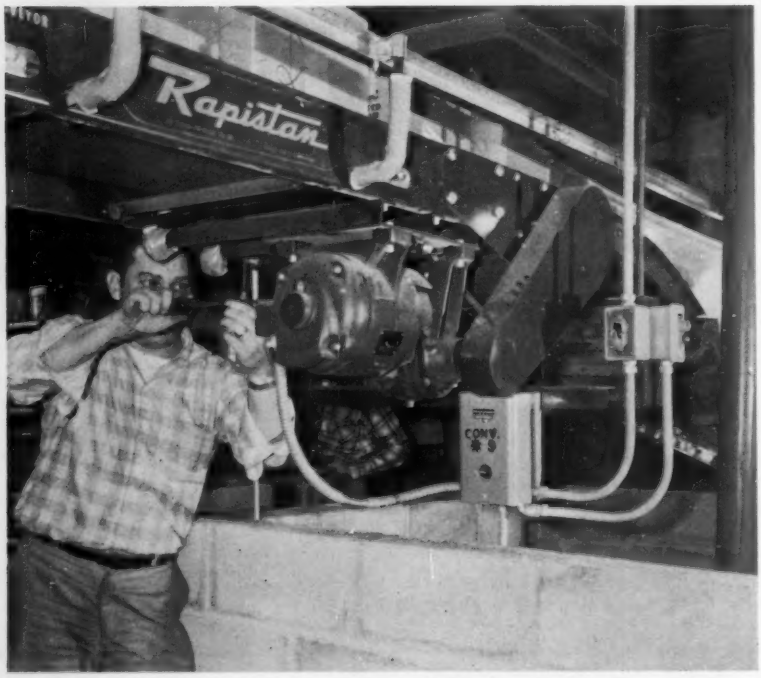
Wiring modernization

By D. W. Gregory
Superintendent
D. W. Gregory Electric Co., Inc.
Washington, D. C.

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers
- Electrical Inspectors ✔
- Industrial Engineers
- Consulting Engineers ✔

Reel light attachment bodies were installed to handle portable equipment that had to be rolled from one spot to another in the kitchen.



Complete rewiring was accomplished without interruption of service during regular hours of warehouse operation.

◆ WHEN THE People's Drug Stores warehouse was expanded with a six story addition, and the food commissary and laundry moved to a nearby location, we were engaged to wire their completely automatic conveyor system, new bin lighting system, elevators, modern new electrical cooking and laundry equipment.

The warehouse had been redesigned for greater storage capacity and for the faster and more efficient handling of merchandise. Our job was to rewire the entire building, install new lighting panels, feeders, branch circuit wiring, and accomplish this without interruption of service during the regular hours of the warehouse's operation.

Existing wiring used

Existing wiring was obsolete. In our effort to hold down costs of remodeling from a service capacity of 1200 amp. to 4000 amp., we proceeded with a view to using what we could of the existing raceway system.

In selecting the best type of heat resistant wiring for the commissary and warehouse, we were able to control labor costs on the over-all job, since this wire is designed to carry a heavier load without exceeding allowable temperatures. It made possible using the existing small conduits and raceways for carrying more heavily loaded circuits.

We used 5 hp motors geared to pull a greater load on the maximum size conveyors installed. The location of slimline lighting fix-

during business operation

tures at important conveyor spots in the warehouse and at sufficiently frequent intervals required study, and the installation of a type of lighting fixture for bins where small items are stored necessitated special design. Panels in the area controlled lighting with a push-button type of circuit breaker.

Noise modified

Rewiring during full operation of the warehouse posed a problem of modifying noise. We searched until we found a core-boring machine with a diamond-tipped cutter to drill holes through a concrete floor comparatively noiselessly.

We cut some 450 cylindrical holes at the rate of one-inch a minute that were smooth, clean, without flaking or patching. The noise would have been disrupting and intolerable if we had had to resort to an air compressor drill.

We retained the old building's transformer vault until we had new service connected and set up, and then removed it.

Reel lights installed

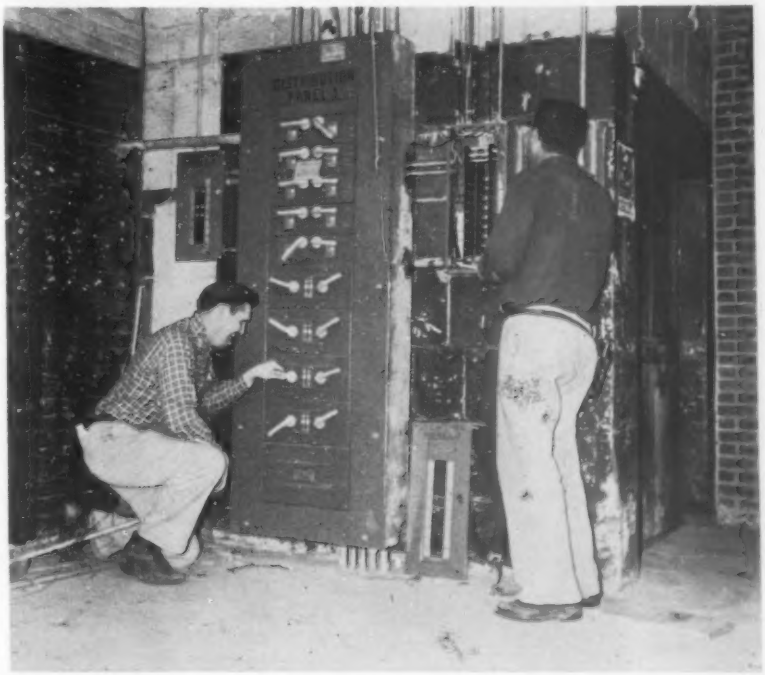
A complete kitchen and bakery with all electrically operated equipment required some 50 motors of 10 hp and down. Portable equipment like food mixers, food choppers, etc., that had to be rolled from one spot to another in the kitchen were best handled by installing reel light attachment bodies.

Ceiling pull cords used

Pulling cords down from the ceiling and plugging them into equipment, it made possible rolling an electric mixer, for example, right up to the kneading boards or oven. This electrical equipment for large-scale service to their chain drug stores is the most modern to be found on the market.

Any remodeling job where capacity is being increased presents a new set of problems to any contractor. In remodeling the electrical system of a large warehouse we were able to solve problems that we had met in past remodelings, and new experience has enlarged our base for future remodelings.

This warehouse remodeling job involved a changeover from a service capacity of 1200 amperes to 4000 amperes.



Existing conduits were rewired with heat resistant type wire which carries a heavier load without exceeding allowable temperatures.

Texas wiring

By Ruel McDaniel

This article should be especially helpful to the following readers:

- Electrical Contractors ✓
- Electric Utilities ✓
- Electrical Wholesalers ✓
- Electrical Inspectors ✓
- Industrial Engineers
- Consulting Engineers ✓

Lawrence L. Froelich, local manager for Central Power and Light Co., examines disconnect switch serving recently air-conditioned rooms.

Two-inch conduit leads from switch box along outside wall of hospital building. A separate circuit breaker serves each two rooms.

◆ CALHOUN COUNTY Memorial Hospital, a publicly-owned operation, faced the serious problem of air conditioning the original building while the over-crowded Texas hospital continued to operate at full capacity.

The institution had been constructed without the architect's or the hospital board's considering the use of air conditioning later, and now the job had to be done—*without* spending a lot of money.

A new addition, built in 1956, provided air conditioning, using a chilled water system. Only the operating room of the original unit had been air conditioned.

Homer Horton, hospital administrator, had the emergency room air conditioned by use of a window unit, tying in the connection with the existing power lines into the building. This worked satisfactorily, so he air conditioned the laboratory the same way. He decided he could possibly continue the program, conditioning the patients' rooms, one by one, as he was able to get to them; but before he got around to the first ward room, the lighting system began blowing fuses. He then spent some money in an effort to overcome this problem but the laboratory and emergency room were straining the electrical system, and maintenance costs shot up.

Administrator Horton then called in Lawrence L. Froelich, local Central Power & Light Company manager, and asked for

hospital modernizes for air conditioning

recommendations to overcome the maintenance problem and condition the twenty rooms of the original hospital unit. Mr. Froelich in turn asked L. D. March, district engineer for CP&L at Victoria, to come down and check out the problem.

The result was installation of window units in all twenty rooms of the older unit of the hospital at a cost, for wiring and actual installation, of only $1,100, and the wiring was done while most of the rooms were occupied by patients. Nobody was disturbed by the work of installing the needed wiring and conduits.

The new wing was being cooled by a chilled water system, the power being supplied from a pole and transformer rack near the hospital.

The wiring for the twenty window units (and the laboratory and operating room, previously hooked up to the existing wiring) called for a completely separate circuit, which was tied in at the transformer rack. The new circuit has its own main disconnect switch.

Fusing was figured on the basis of starting current needed to switch on all twenty-two units at the same time, which of course never happens, but the base provides exceptional safety margin.

The plan called for setting a circuit-breaker for each two rooms, and the fusing here is sufficient to start both units simultaneously without danger of over-loading.

By inserting the half-inch conduit into a hole drilled between each two rooms, it was possible to reach the air conditioning unit in each room from the single hole, which was drilled into the wall from the outside.

All room conditioners are one-ton units, operated at 220 volts.

Cost was held down and the work was done without disturbing patients by installing all conduits and wiring along outside of building, about two feet above ground.

(Continued on page 140)

The original hospital building was erected with no provision for future air conditioning. As individual units were added, one by one, the lighting system began blowing fuses and maintenance costs shot up.

One-ton window air conditioning units and wiring were installed while most of the twenty hospital rooms were occupied by patients.

How architect cooperation helps solve wiring problems

By Harry J. Miller

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers
- Consulting Engineers ✔

◆ CONTRACTORS and all others allied with the wiring business need to impress upon architects the importance of including in their plans a comprehensive set of electrical specifications, in the opinion of Kenneth D. Brumbaugh, chief electrical inspector of Sarasota County, Fla.

"Only a fully-detailed layout," he pointed out, "will insure the submission of electrical bids that will be reasonably close to one another.

"When contractors are required, of necessity, to make their own layouts, the way is paved for inadequate wiring and a wide variation in estimated prices.

"Especially where the larger commercial jobs are concerned," said Brumbaugh, "architects need to be counseled by electrical engineers or other expert electricians, fully cognizant of the electrical contractor's problem when it comes to preparing an estimate. These men can help create plans and specs that are accurate enough from an electrical and Code standpoint to insure that every qualified contractor bidding knows exactly the conditions of the job and just what he's bidding on."

Avoid mere estimates

Pointing out that some architects are prone to consult electrical catalogs of ancient vintage in compiling their plans, Brumbaugh commented, "In the absence of adequate specs, or where a contractor makes up his own wiring plan, he may simply compile and submit an estimate on the mere bare bones of a wiring system in his anxiety to snag the job.

"Such a price may win the contract, but it's a hollow victory, since the resulting skimpy wiring installation may not be at all what the architect had in mind," Brumbaugh continued.

"On the other hand, the contractor who envisions a quality installation may lose out because *his* plans were evolved with an adequate wiring system in view, and, as a consequence, his price was deservedly higher," he said.

Brumbaugh feels that such inequities would become non-existent if all contractors were to bid on an electrical plan designed through the architect's consultation with qualified electrical advisors.

"For example," declared the chief inspector, "it isn't enough for specs to state a '10 ampere toggle switch'. These should be designated by number also or 'equal to' standard name-brand merchandise.

"Panel boards, distribution services, etc., should be definitely fixed in the specs so the contractor will know exactly what he is expected to furnish," Brumbaugh went on.

"Where architects fail to enlist the services of an electrical engineer, it is sometimes their custom to lean for such assistance on the electrical contractor. This makes for unfair competition, since the contractor then assumes he has his foot in the door and an edge on other bidders for the job.

"But if the job's plan is engineered by someone who has no such personal ax to grind, then every contractor is on an equal footing," he said.

Bid-peddling evil

Another evil that Brumbaugh points out is the form of bid-peddling that results when a contractor has aided an architect in the preparation of layout or specifications. The contractor then may feel the architect is duty-bound to let him meet or beat the low bidder's estimate. This is particularly evident on larger jobs where the architect specifies that names of subcontractors be submitted for his approval. Here, the architect may exercise some influence in the direction of the successful bidder, justifying his action as self-defense to protect the interests of the owner of the structure to be wired.

Said Brumbaugh: "Where an electrical engineer is consulted, he has a better chance to sell a quality job for contractors to bid on, since he's in contact with the architect, as well as the owner. Since it is easier to sell quality *before* bids are in, than it is to begin with a low-grade job and then pile on extras, the engineers thus influences a better installation, satisfactory to the architect and his client, which embraces wiring for future expansion, rather than for barely-met Code standards."

Again, it is obvious that such an engineered job results in a higher-dollar contract to shoot at. And the contractor stands to make more profit on higher-quality merchandise. It costs about as much to set these on the job, as it does to install lower-grade devices.

Thus, the engineer acts as a buffer between owner and architect and an inadequate installation. At the same time, he renders a service that insures more ethical bidding from contractors' ranks.

Bad factors pinpointed

Sarasota's chief electrical inspector pinpoints several factors which muddle the estimating picture.

"A mushrooming area attracts the unscrupulous contractor, along with journeymen-turned-contractors with scant knowledge about bidding the bigger jobs," Brumbaugh advised.

"In the case of the former, some builders of small homes or motels are simply building to sell, interested only in the minimum wiring system that will scrape through inspection.

"On the other hand, we have the spectacle of county occupational licenses costing only $6.50. This invites two-year helpers into the electrical business. They don't know the work, and throw an added burden on inspectors, since the latter can't catch everything," he said.

As a result of this situation, Sarasota conducts evening classes in electrical theory, code, and cir-

(Continued on page 142)

Electrical Contractor R. A. Davis, of Bethesda, Md., checks a fuse panel in an emergency call. At right,

Mr. Davis explains to a customer what happens when an electrical circuit becomes overloaded.

Contractor campaigns for adequate wiring

By R. A. Davis

Bethesda Electric Company
Bethesda, Maryland

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electric Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers
- Consulting Engineers

◆ WE BELIEVE that one of the greatest fields still to be explored, and profitably, is residential heavy-ups. Housing has not kept apace with the rapid strides the electrical appliance industry has made. In any area that is tapped, there is an enormous number of dwellings outmoded electrically for modern living.

Occupants are unaware of the limits of their old 30 ampere services. Many do not know of the hazards of a service overloaded with appliances. Public education through magazines, radio and direct mail and from their utility companies has somehow not "reached" them.

It almost takes an emergency to bring inadequate wiring to their attention. That has been my experience and that is why I have put special emphasis in talking to every homeowner for whom I am doing repair and maintenance, of the need for heavying up their service when consumption warrants it.

For eighteen-month periods I have run weekly newspaper advertisements on living electrically safely and free estimating and checking on home wiring systems. Some of these were large advertisements. We also sent out 1,000 card mailings on the convenience and benefits of electrical living. We have followed up leads furnished by the National Wiring Bureau.

But by far the most effective way of convincing homeowners that we are talking about *their* service equipment when we talk inadequate wiring is in personal contact. We have been doing this kind of an educational job in the past year, and it has trebled our volume of heavy-ups in homes. No other form of promotion seemed to point a finger as specifically as a talk at the customer's home.

The best preliminary is of course when a fuse has blown, lights have gone off, refrigerator is not working. We have thus gained access to a home because of electrical trouble. With this in the forefront of the customer's mind, the best opportunity for talking heavy-ups is provided an electrician.

We try to explain to the homeowner as simply as we are able without getting technical. We explain that a 30 ampere service or 60 ampere or 100 ampere service defines the amount of energy available to that residence for lighting and power.

We show them what happens when in the evening all the lights may be on, refrigerator, water heater and washing machine going, radio or television, and a couple of other appliances. We call attention to how fortunate they were with only a fuse blown, lights out, and a short period of inconve-

(Continued on page 141)

Roundup of utility promotions

The above display is typical of those presented throughout the year at state fairs and similar exhibitions and shows by the Baltimore Gas and Electric Company. Spectators participate in a promotional game (at left in photograph), called the Breakfast Test, by trying to add appliances which they now have at home without blowing a fuse.

Housepower is big business at Baltimore Gas and Electric

RESIDENTIAL SALES Promotion Manager H. F. Carr comments on the Housepower campaign plans of Baltimore Gas and Electric Company:

The 1957 promotion of Housepower in Baltimore during its first full year was most satisfying. Our program is unique in that company employees not only conduct surveys and make wiring recommendations but they give a firm estimate, close the sale and award the job to a Housepower contractor.

Employees sold surveys

These representatives sold better than 34% of the wiring surveys they were requested to make. Over 4,500 jobs, totaling more than $1,000,000 in Housepower wiring, sparked by the Baltimore Gas and Electric Company's promotional activity were installed in our service area during 1957. More than one-third of this amount was financed on the customer's electric service bill by using our convenient time payment plan.

We will continue our Housepower promotion in 1958 along the same lines that proved so satisfactory last year, but will step up our metropolitan newspaper advertising and introduce television as a media. Our newspaper advertising in the city will consist of a sustained program of preferred position ads on Page 2, the Back Page and the Radio-TV page in addition to our frequent 600 line R.O.P. ads.

Again this year, we are planning to offer contractors tie-ins with a series of ads that we will place in twenty county papers. Such a promotion was enthusiastically received last year even though the contractors were obliged to pay a nominal charge, and we feel it will be even more popular this year.

For 26 weeks during the year we will have each week 31 one-minute radio spots saturating the air on 13 stations. And, we will, from time to time, have one-minute commercials on a 10-minute news program on ABC-TV which we sponsor on Saturdays and Sundays, known as "7:20 Dateline."

Contractor aids available

We are making consumer literature available to contractors as well as truck signs, job-identifying lawn signs and signs for exhibition houses. We will have a year-round display of Housepower in a company window and displays at the State Fair and similar exhibitions and shows.

Spectators enjoy our "Breakfast Test" promotional game used at fairs and shows and try to add the appliances that they have at home without blowing a fuse.

Wiring demonstrations and talks will be given at schools and to civic club groups and Housepower films will be shown at dealer cooking schools and other appropriate assemblies.

The Housepower Forum is now being successfully conducted for the third time at the University of Baltimore. Contractors satisfactorily completing the course are awarded a certificate by the University and ourselves.

Enthusiasm for the Sales Training Course is running high among the contractors and they indicate their business has improved as a result of it. During the year we will schedule these forums as frequently as there is a need for them.

There is no doubt about it, Housepower is big business in Baltimore.

on adequate wiring for 1958

Local Georgia contests support national campaign

IN GENERAL, Georgia Power Company's plan is to promote wiring modernization of old homes and to upgrade wiring in new homes by conducting a "Housepower Contest" for electrical contractors and a "Medallion" home program for building contractors, relates Residential Sales Manager M. T. Reeves. A separate contest is conducted for each of our seven geographical divisions where enough interest is shown by electrical contractors.

We are tying our activity to the EEI and Live Better-Electrically programs. We are supporting the local program with a bi-weekly series of ads in daily newspapers in all Georgia cities where we maintain division offices. Also, we are running, as was done last year, a bi-weekly series of ads on wiring modernization in the industrial section of the Atlanta Journal and Constitution. Cooperating electrical contractors are participating in this advertising and editorial coverage.

Additional support to each local program is provided by Georgia Power Company as follows:

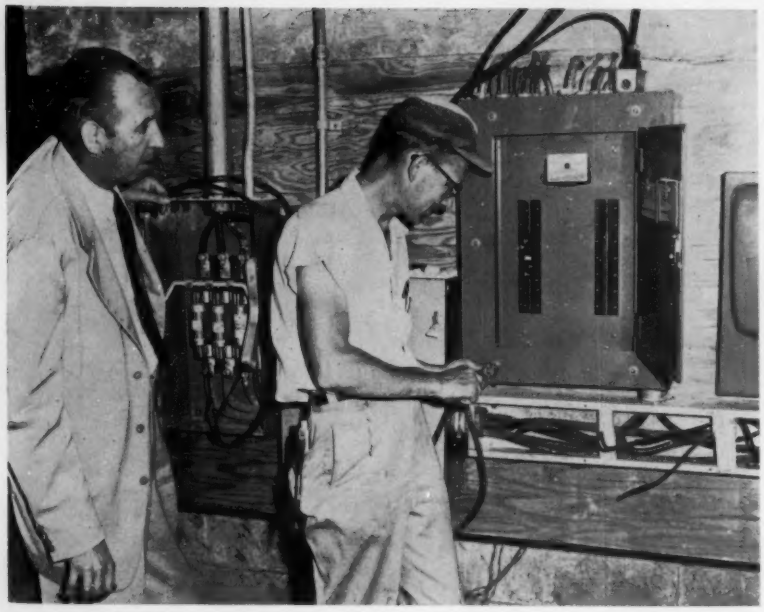
1. Literature for customer handout or direct mail.
2. Electricity in Building magazine will be mailed to nearly all builders, realtors, bankers, etc. on a monthly schedule.
3. Posters, streamers, stickers, etc., will be provided for contractors windows and trucks.
4. Signs for individual houses will be furnished and assistance provided in erecting project signs.
5. Medallion emblems will be furnished for all homes qualifying under this program.
6. Leads developed from the "Write the Caption" consumer contest will be furnished cooperating electrical contractors.
7. Wide distribution of contest entry forms will be made through Georgia Power stores, bill collection points, dealer stores, and contractor shops.
8. Assistance will be provided for electrical contractors who wish to promote wiring modernization. Mailing lists of 2 wire service entrance customers will be supplied for any meter route or area desired. Sample letters will be prepared and produced for contractors direct mail campaigns in these areas. Appropriate literature will be supplied.
9. Sales training classes will be conducted for electrical contractors who wish to improve their knowledge of this important part of their business.

Contractor contest: Credit points in the contest are awarded on the following basis for the rewiring of old homes and in new homes to "above code minimum," and for major appliances:

1. Every new home wired for and meeting the bronze medallion standard will receive—500 credit points.
2. Every new home wired for and meeting the gold medallion standard of electrical capability will receive—1,000 credit points.
3. New homes or old homes rewired will receive credit as follows:

(a) 200 amp. ser. ent. (0000 wire) W/3-230 V Pull-outs—200 points
(b) 165 amp. ser. ent. (000 wire) W/3-230 V Pull-outs—175 points
(c) 150 amp. ser. ent. (00 wire) W/3-230 V Pull-outs—150 points
(d) 125 amp. ser. ent. (0 wire) W/3-230 V Pull-outs—125 points
(e) 100 amp. ser. ent. (#2 wire) W/2-230 V Pull-outs—100 points
(f) Range circuit—50 points
(g) Dryer circuit—50 points
(h) Water heater circuit—100 points
(i) Dishwasher circuit — 50 points

Residential Sales Engineer Homer Youngblood, of Georgia Power Co., presented the 1957 Housepower Contest plans to Atlanta contractors.



1957 Contest Winner Maurice Womack, of Womack Electric Co., Atlanta, supervises a "Full Housepower" installation in a new home.

(j) Built-in bath room supplemental, etc., electric heater—50 points

(k) All electric heated home, including heat pump—500 points

Awards. At the close of the contest a drawing will be held for prizes on the basis of one chance for each 50 credit points. Only one prize in each category (1st, 2nd, 3rd, etc.,) will be awarded to an individual contestant. A contestant may be an owner, electrician, estimator, contractor, or clerk employed by any licensed electrical contractor.

Prizes to be awarded are as follows: 1st Prize—choice of one-ton room cooler or automatic clothes dryer; 2nd Prize — automatic clothes dryer; 3rd Prize—an $85 suit of clothes; 4th Prize—Electrical wholesalers will supply four prizes totaling $300.

In addition to the above prizes the contractor, electrician, estimator, clerk or any person who is a full time employee of a licensed electrical contractor, who sells and installs the largest number of built-in bath room heaters during this campaign will be awarded an $85 suit of clothes. At least 15 heater installations will be required to qualify.

The Live Better-Electrically program is set up for home builders. We give the electrical contractor additional credit for homes meeting the standards for gold or bronze "Medallions" which, we hope, will inspire him to help us "sell up" to the Medallion home standard in new home construction.

A postal card is provided contractors for reporting wiring installed. We verify by checking the house or the inspection record, and record the credit for each contractor.

Last year we conducted similar campaigns, except the prizes offered were in the form of vacation trips to Miami Beach and Nassau. In this program we offered, as we are doing this year, the Housepower Forum (Sales Training Course) which was accepted and completed by 104 electrical contractors.

Contest results: The following tabulations indicate results of the Atlanta Division Housepower contest and sales training course conducted from April 1 through November 1, last year:

Service entrance equipment installed: Certified adequately wired homes—17; 400 amp. service entrance—5; 200 amp. service entrance (0000 wire)—63; 165 amp. service entrance (000 wire)—28; 150 amp. service entrance (00 wire)—27; 125 amp. service entrance (0 wire)—125; 100 amp. service entrance (#2 wire)—440; 80 amp. service entrance (#3 RH wire)—273.

Major Appliance Circuits Installed: Range circuits—686; Dryer circuits—459; Dishwasher circuits—423; Water heater circuits—62; Attic fan circuits—395; Room air conditioner circuits—535.

Other Miscellaneous Information: Contractors completing sales training course—104; Above code service entrance in new homes—611; Above code service entrance in rewired homes—367.

Financing plan: A big factor in helping to sell wiring modernization jobs is our wiring financing plan, started last year. The electrical contractor simply collects 10% down, gets two forms signed by the home owner and we send the contractor a check for the balance. The owner then pays the power company in monthly payments along with his regular electric bill. Wiring modernization financing is provided for from $30 to $500 and extended over 24 months.

During the last 9 months of 1957 we financed 181 jobs averaging about $164 each. We expect, and hope, electrical contractors and home owners will continue to take advantage of this convenient way of bringing wiring up to modern day standards. In this way people living in older homes can enjoy modern day electrical labor saving appliances and comforts just as much as if they owned a new home.

South Carolina emphasizes electric space heating

For 1958, reports Promotion Manager Harry T. Huffman, South Carolina Electric & Gas Company is combining all promotions into one with the emphasis on electric space heating. It is felt that by aggressively promoting *heating* the residence will naturally be all

electric. Further, adequate wiring will be installed.

In order to encourage electric space heating, we are offering a cash bonus of $2.00 per whole thousand BTU output for heating systems installed on and after January 1, 1958, and is available to our residential, farm, and general service customers who meet the following requirements:

1. Electricity must be the sole method of space heating.
2. A minimum of 10,000 BTU's of heating must be installed.
3. Only permanently installed electric heating equipment bearing the underwriter's laboratory stamp of approval will be considered eligible for the bonus (portable electric heaters *will not* be considered eligible for the bonus).
4. The maximum allowable wattage per thermostat will be 5 kw for resistance heating. Each room of a residence must be individually thermostatically controlled.
5. Each heat pump must be controlled by its own thermostat.

Either resistance heat or the heat pump is acceptable. Where resistance heating is installed, 3413 BTU per kw is used for the basis of figuring the bonus. The BTU output of heat pumps is based on a 50° heat source. Supplemental resistance heating elements installed in heat pumps are not considered for bonus purposes.

All residences who qualify under this promotion are eligible for a Live Better Electrically Medallion.

To date, we have paid eleven bonuses of which seven are residences. With new construction just starting in our territory, we can expect an increased number to use this clean, efficient method of space heating. It is estimated that between three and four hundred systems will be installed in our area this year.

Louisiana Power and Light plans far-reaching promotion

WIRING CONSULTANT E. I. Blanchard, of New Orleans, gives a detailed account of Louisiana Power and Light Company's 1958 Planned Wiring Program:

As the result of an almost continuous barrage of advertising and promotion the man on the street now knows that his appliances will not operate properly and efficiently if his home has low Housepower.

With this awareness for the need of good wiring developed, we must now promote action on the part of the householder to insist on full Housepower in any home he builds, buys or rents.

To follow through on this promotion, our Planned Wiring Program for 1958 will include:

Live Better . . . Electrically: Our company has adopted many parts of this program and our salespeople will miss no opportunity to sell the idea of "Live Better . . . Electrically — With Full Housepower." This concept of modern electrical living simply cannot be accomplished unless a good wiring system has been planned and installed to allow full usage of electrical equipment.

Farm Better . . . Electrically: This is a companion program to Live Better . . . Electrically, and the two should be aggressively promoted among rural customers.

Appliance dealers: Our distributors and dealers should be well aware of these industry-wide programs, but it will be up to us to see that they take the necessary action to capitalize on the advantages at their local level.

The electrical contractor: The electrical contractor is the key man in our wiring program, but we must recognize that he is not necessarily on our team just because he is in the electrical business. We must be sure that he appreciates the programs outlined herein and that he realizes that he can make a profit by tying-in with them.

The Medallion Home: The Live Better . . . Electrically Medallion Home Program is designed to stimulate the sale of appliances for new homes and to create consumer demand for full Housepower and Light For Living.

This program will provide a nationally recognized hallmark of electrical living that will be promoted on a national and local level by utilities, manufacturers, distributors, dealers, contractors and trade associations.

The Louisiana Power & Light Company will participate in this activity which sets in motion a long-range program which should produce some good results in 1958 and become increasingly effective in the years to come.

Builder contacts: Our Developmental Builder Contact men will work especially on the Medallion Home program because of its promotional value for the multiple-unit builder.

Louisiana Power and Light Company representatives T. N. Whitley and E. I. Blanchard assist vocational-agricultural teacher Ernest Bahm in high school classroom demonstration. Wire size sample board holds samples that are labeled and removable for close examination.

Wiring modernization: We still have a big selling job to get more wiring modernization done in the existing homes in our service area. We will enlist help from our lending agencies, our dealers, and our electrical contractors to get this done, for they can all profit from an aggressive wiring modernization activity.

Advertising: One billboard posting on Housepower is scheduled for 1958. In addition, we will continue to feature planned wiring in our newspaper, radio and television advertising program. We will tie-in our Housepower promotion theme with national activities, and will feature a direct mail piece to our farm customers on the Housepower contest.

Group meetings: A group meeting is the most practical and economical way to do mass selling, and our planned wiring story lends itself well to this technique. Our story must be told and retold to gain advantage of its full impact, and the wiring consultant will continue to try to keep the field supplied with a wide variety of planned wiring films and promotional ideas for school, civic, and other group meetings.

Campaigns: Our special emphasis campaigns offer our salespeople another excellent opportunity to tell the planned wiring story, as no promotion of electrical utilization equipment can be successful unless the proper wiring is installed to serve that equipment.

Our dealer allies should be urged to "sell-up" planned wiring as well as the actual merchandise as their future sales will be much easier with full Housepower available.

Commercial and industrial: The necessity for good wiring in our commercial and industrial buildings is becoming more apparent to the tenants every day as they turn to more and more merchanization. Our salespeople can perform a real service for our customers and our company by working closely with architects and builders in the layout of good, well-planned wiring for these buildings. Frequently they can make suggestions for changes or additions that will result in a real plus value for the future tenants.

Sales aids: The builder publication, "Electricity In Building" will be mailed to all our architects and builders again in 1958. We feel that this magazine featuring wiring, lighting, and all electrical living can be a good door-opener to be followed up by our salespeople in promoting our own program.

We will continue to furnish our people in the field with handbooks, catalogs and reprints of articles of interest on wiring as they appear. On request we can provide extra copies of these for distribution to people outside our organization.

Wiring Layouts: The foundation of our planned wiring program through the years has been our free wiring layout help. Each year more and more of our customers call on our salespeople for this service. Results have shown that when we sell planned wiring, customers more readily buy all other electric services.

Medallion Homes share spotlight with Housepower

THE BIG NEWS at Dallas Power and Light Company this year in home building is the Medallion Home Program, a promotion aimed at establishing standards for the electrical content of new homes. A bronze (or gold) medallion is given to builders of homes that meet the standards.

In addition to the medallion, which is to be mounted in a visible but inconspicuous place on the house, the builder will receive support from DP&L in newspaper advertising, radio, and other media.

The Medallion Home will be pre-sold to the public through an extensive campaign of national advertising and locally through DP&L's all-media advertising.

Builder benefits emphasized

In general, to qualify for the award, a home must have Full Housepower, certain installed appliances, and have a well-designed lighting plan.

What does a builder gain from the Medallion Home Program? The prestige of a nationally recognized symbol of excellence, Faster sales—greater profit, The Medallion builds buyer confidence, and Advertising and sales promotion support from DP&L.

This utility will again join forces with the Home Builders Association of Dallas County in presenting the annual Parade of Homes. Advertising and promotion plans are essentially the same as in past Parades with DP&L representatives on hand to explain the electric features installed in the homes.

Utility backs Home Show

The annual spring Home Show will be backed up with utility advertising and representatives will be on hand to display light conditioning, electric kitchens, and explain Full Housepower.

Builders will receive cooperation and support when their promotions cover the opening of a new subdivision in which the display home is typical of those to be built and includes the following: electric bathroom heaters, complete electric kitchen and laundry, planned lighting, and is appropriately decorated and furnished during the display period. All homes must qualify with Full Housepower.

Assistance DP&L will render in connection with the initial display home may include any or all of the following display aids: promotion assistance, outdoor floodlights during the showing, Home Service personnel as available, initial installation of light bulbs required for proper lighting, and display signs calling attention to the homes' electric features.

In promoting Full Housepower, customers will be advised to have a complete job done, rather than piece-meal wiring. Three good reasons for doing the whole job are: (1) Less expense in the long-run. (2) More convenient to do the job right at one time. (3) No waiting to use any desired appliance.

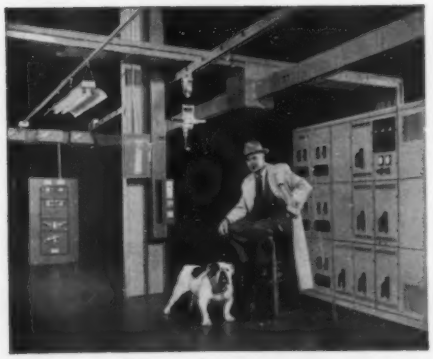
Recommendations for Full Housepower include:

An adequate service entrance of not less than No. 2 size conductors (three No. 2 RH conductors are recommended) with main switch or service panel sized accordingly.

Special purpose circuits for appliances (range, washer, dryer, dishwasher-disposer, air conditioner) and for hobby shops, outdoor use on the patio, for garden lighting, security lighting.

Spare circuit capacity in the panel for future needs.

New circuits in seconds at half the cost!



COORDINATED COMPONENTS. BullDog equipment works together to feed specific industrial, commercial or institutional power needs. Whether it be LO-X®, Plug-In Duct, a substation or a complete distribution system, BullDog can help you put a business in top electrical shape and keep it there! © BEPCO

As power goes, so goes production. Recently, an automotive parts plant smoothed major kinks in *both* with an installation of BullDog Plug-In BUStribution® Duct. Where powering new machines and constant shifting of existing equipment once meant electrical downtime and delay, machines now plug into power in seconds. No rewiring, downtime or costly production halts. And the electrical cost of moving and adding machinery has been slimmed by 47%.

Plug-In Duct is part of a complete *electrical* distribution system engineered by BullDog for capacity, reliability, *flexibility*. Consider BullDog products for all your jobs. They are easy to install, help you cut down call backs. Consult your BullDog field engineer or distributor. Or write BullDog Electric Products Company, Detroit 32, Michigan.

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

Consult the following Southern representatives:

Wilson Electrical Equipment Co.
2930 Commerce St., P.O. Box 1725
Houston, Texas

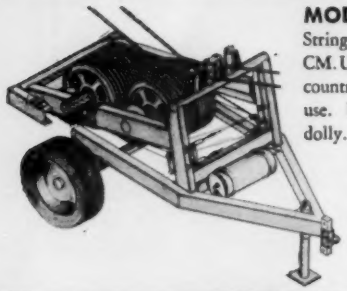
Standard Electric Mfg. Co.
2401 Federal St., P.O. Box 1138
Dallas 1, Texas

Walker Electrical Co., Inc.
125 Bennett St., N.W., P.O. Box 8, Sta. D
Atlanta, Georgia

Partial showing of the now ***COMPLETE*** line of . . .

PENGO TENSION WIRE STRINGING EQUIPMENT

Manufactured By* PETERSEN ENGINEERING CO., *Santa Clara, Calif. 14 Patents Pending

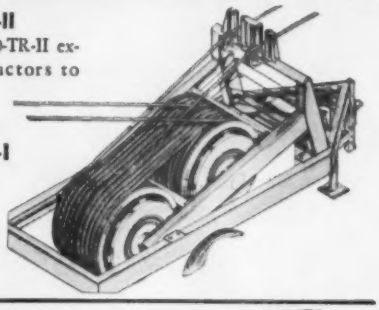


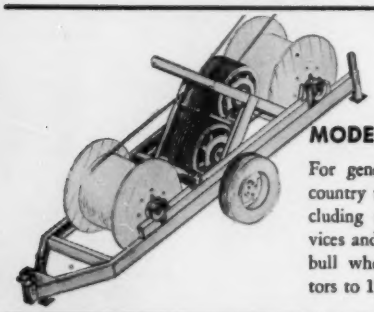
MODEL 5000-TR-II
Strings two conductors to 556,300 CM. Used primarily for very rough country work; also for general use. Use separate reel-carrying dolly.

MODEL 5000-TR-I
Similar except strings one conductor.

MODEL 6000-TR-II
Similar to Model 5000-TR-II except larger. Conductors to 1,272,000 CM.

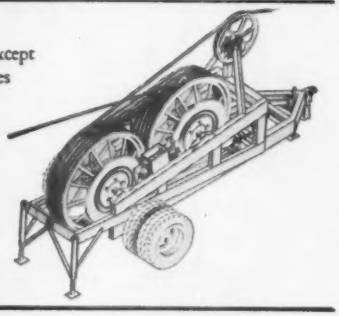
MODEL 6000-TR-I
Similar except for one conductor.

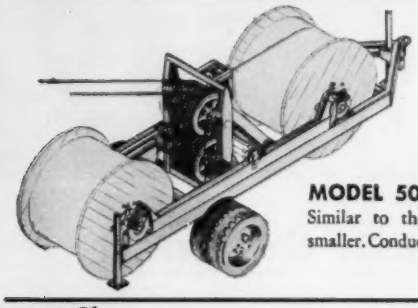




MODEL 6000-WS-TR
For general and medium rough country use. A complete unit including trailer, reel-carrying devices and its own double pair of bull wheels. Conductors to 1,272,000 CM.

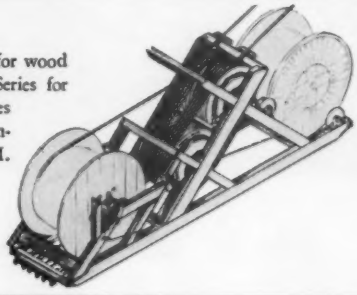
MODEL 7000-TR-I
Similar to model 6000-TR-I except larger. Conductors to 2 inches diameter.

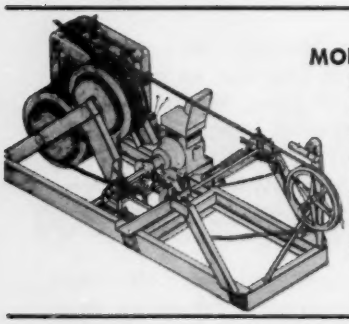




MODEL 5000-WS-TR
Similar to the 6000-WS-TR but smaller. Conductors to 556,300 CM.

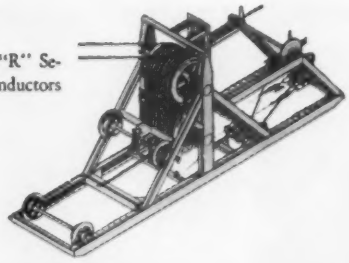
MODEL 6000-W
Available in "S" Series for wood or steel reels, in "R" Series for steel reels, or "SR" Series for trailer mounting. Conductors to 1,272,000 CM.

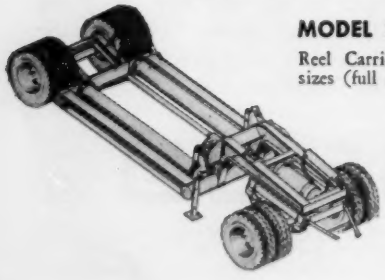




MODEL 6500
Bull Wheel Cable Puller. Available in "R" Series for steel reels, "S" Series for wood reels. Conductors to 1,272,000 CM. Also available in "LWR" Model for extra-large steel reels. Model 5500 similar (smaller).

MODEL 5000-SR
Available in "S" Series, "R" Series, or "SR" Series. Conductors to 556,300 CM.





MODEL 7500
Reel Carrier. Takes the largest sizes (full range) of steel reels. Loads and unloads with one man. No auxiliary equipment needed except the truck that pulls it. For use with any one of the tensioning machines shown on this page.

ADDITIONAL MODELS NOT SHOWN

Tension Reel Trailers

MODELS 2, 3, and 4, Two-Wheel Straddle Dollies not shown. For use with any one of the tensioning machines shown on these pages.

Tension Stringers

MODELS 6000-SK-I and 6000-SK-II For one or two conductors to 1,272,000 CM. Skid mounted for installation on owner's equipment.

MODELS 5000-SK-I and 5000-SK-II Skid mounted for installing on owner's equipment. For stringing one or two conductors to 556,300 CM.

MODEL 5000-WS-III Strings three conductors to 556,300 CM. For mounting on low-bed or full trailer.

MODEL 6000-WS-III Strings three conductors to 1,272,000 CM. For mounting on low-bed or full trailer.

Two PENGO model 6000 TR-II wire tensioners being used by Pacific Gas and Electric Co. in reconductoring job between Vacaville, Calif. and Cottonwood, Calif. 285 miles of 500 MCM copper is being replaced by 954 MCM aluminum in this operation.

Newest method of stringing overhead lines

Two PENGO model 6500 Bullwheel Cable Pullers used by Pacific Gas and Electric Co. for pulling in the new line on the job mentioned above. Unit, manned by an operator and one reel tender, pulls the pulling line (in this instance the old copper conductor) over the double neoprene lined Bullwheels and winds it for shipment in a single operation.

- ***Safest, most economical way of stringing transmission, distribution and even secondary lines.***
- ***Its greatest savings are effected when stringing over and through energized circuits . . . by far the safest, too!***
- ***14 Patents Pending!***

Smooth, postive control of conductor tension can be maintained at all times regardless of model or size of PENGO tensioning equipment used. The large, specially designed PENGO disc brakes are mounted away from the Bullwheels to assure dissipation of the heat generated by the continuous braking action and prevent transmission of the heat to the Bullwheels.

Note the wide range of models on the opposite page available for all types of jobs or terrain and for all sizes of conductor.

List your requirements and send for descriptive literature and prices.

Made by the makers of the World-Famous
PENGO EARTH AUGERS

PETERSEN
ENGINEERING COMPANY
Santa Clara, Calif.

PETERSEN ENGINEERING CO.
Santa Clara, California **Dept. 19**

Please send me more information on the new Pengo wire stringing equipment.

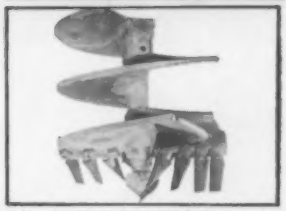
Name_____

Firm_____

Address_____

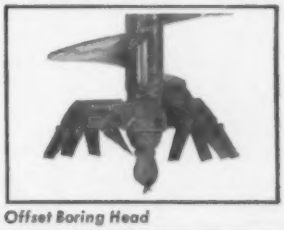
City_____ State_____

Other PENGO Products include:

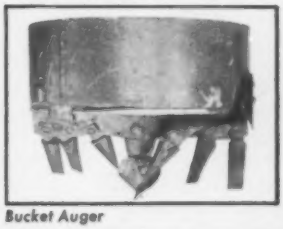


24 inch Heavy Duty Flight Auger

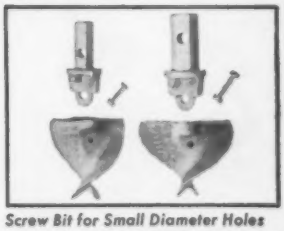
Double-Helix Heavy Duty Auger



Offset Boring Head

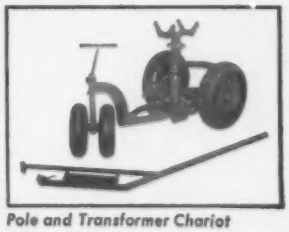


Bucket Auger



Screw Bit for Small Diameter Holes

Pulling Eye



Pole and Transformer Chariot

Florida Power and Light sells the "big" difference

FLORIDA POWER and Light Company's 1958 sales program entitled, "Sell the Big Difference," will fully supplement locally all phases of the Live Better Electrically and Housepower promotions, comments J. H. Keele, sales promotion manager.

Our over-all workload objectives are to complete 270,000 scheduled sales contacts with customers, sales and trade allies and others, in addition to conducting at least 2500 mass demonstrations, presentations and exhibits to reach two million people.

The advantages of Full Housepower will be stressed in all of these activities, especially with regard to new dwelling units and business structures. For instance—we expect to obtain the installation of 100 amp. or larger service entrance in at least 65% of all new dwelling units constructed in our service area this year.

Local promotion especially directed to adequate wiring and Housepower will include:

(1) 125,000 sales interviews with architects, home builders and other interested members of the building trade;

(2) The use of four automatic wiring boards and other attention-compelling displays at Home Shows, Fairs and other public gatherings;

(3) The use of colorful signs outside of homes under construction that are designed for more Housepower;

(4) Dynamic newspaper and radio advertising to publicize model homes that have been designed for more Housepower;

(5) Mass demonstrations, presentations and exhibits emphasizing the benefits of Housepower;

(6) Special showings of "The Magic Link," "A Family Affair" and other movies which stress the need for and advantages of Housepower;

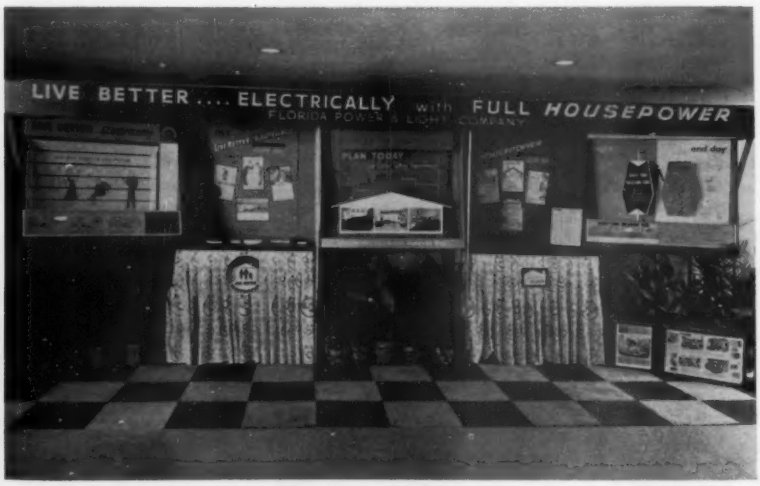
(7) The wide distribution of thousands of folders and booklets (especially the Bottleneck folder which is adapted to wiring conditions in our service area); the active promotion of the $100,000 Housepower Contest.

To illustrate the progress made within the last four years, the following figures show the type of service entrance that has been installed in all new homes contracted in our service area, regardless of location, price or size of the dwelling unit:

Per cent wired with 100 amp. or larger service entrance: 1954—17.7 per cent; 1955—35.9 per cent; 1956—46.6 per cent; 1957—59.8 per cent.

Per cent wired with sufficient capacity to serve electric range and water heater: 1954—93.1 per cent; 1955—95.4 per cent; 1956—95.7 per cent; 1957—97.6 per cent.

Four automatic wiring boards are among the attention-compelling displays utilized at home shows, fairs and other public gatherings to promote adequate wiring and Housepower by Florida Power and Light Co.



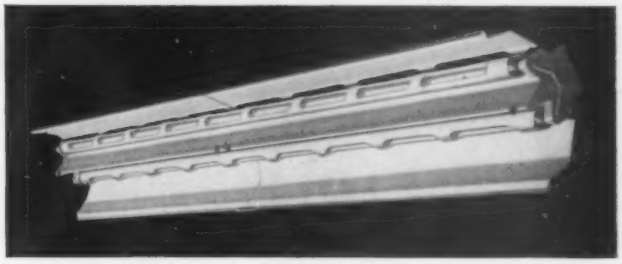
Live Better . . . Electrically with Full Housepower displays are presented at large home show exhibits by Florida Power and Light Company.

Suspended 30 feet above the playing court of the Boston Badminton and Tennis Club are two rows of Wheeler Power-Lume fixtures with G. E. Power-Groove lamps. Beneath this new indoor sportslighting development, players (above) open a match in bright, glarefree, shadowless light. Completing the ideal lighting situation, club members note no discernible stroboscopic or "flicker" effect when they or the ball are in motion. Footcandle level runs from 35 at net to 30 at baselines.

A SPORTS LIGHTING FIRST— WITH WHEELER POWER-LUME FLUORESCENT FIXTURES

Boston Badminton and Tennis Club's recently relighted court represents a major breakthrough in indoor sportslighting as newly developed Wheeler Power-Lume fixtures with Power-Groove lamps are installed. Lamp grooves are positioned downward at an angle of 50° from the vertical for the primary purpose of obtaining excellent flat-bottomed candlepower distribution. This eliminates undue concentration of light directly below fixtures. The result is much less glare and no "flicker", with a minimum number of rows required for uniform illumination over a given area.

Power-Lume by Wheeler — America's most versatile new fixture in 2 types of construction, "F" and "V" . . . specifically designed to utilize fully the extra illuminating power of the new Power-



Groove lamps. Delivers *twice* the amount of lumen output per foot of lamp length. For complete details, write for New Product Data Sheet No. 100 D.

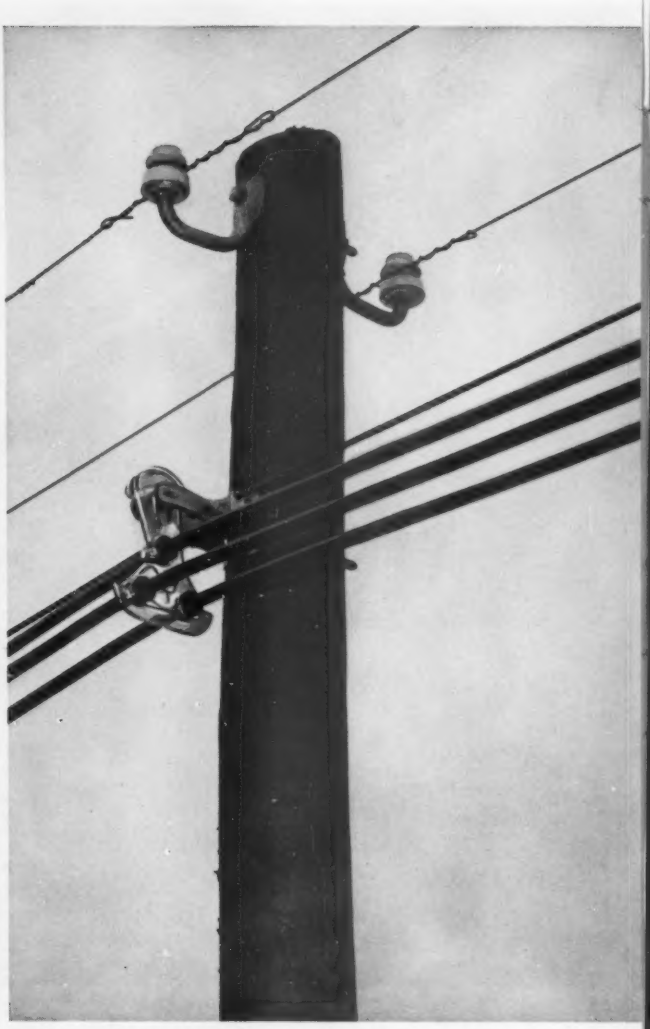
Wheeler **REFLECTOR COMPANY**

(Division of Franklin Research Corp.)

275 Congress Street, Boston 10, Mass.

Distributed Exclusively Through Electrical Wholesalers

Conventional aerial system required cross-arms... tree-pruning is major cost and irritation factor with utilities companies.



New Roebling Aerial Spaced System with ROECLAMP requires only *one foot* of clearance through trees! Note improved, compact appearance. No cross-arms are needed.

Key to the system is Roeclamp ...unit construction means no separate parts... installs without tools... Linemen go for it!

Here lineman has grommets mounted on conductors and messenger and is about to mount ROECLAMP over messenger . . . ease of installation means one crew can install more line footage per day . . .

New Roeclamp Cable System Costs 60% Less than Self-Supporting Cables, Minimizes Tree Problems, Installs with Ease, Looks Better!*

Roebling Self-Supporting Aerial Spaced Cable is the perfect answer in areas where trees are a problem, where appearance is an important factor, or in areas where the most compact, economical and easily serviced system is desired. That means *just about everywhere!*

The Roebling System, with the remarkable new ROECLAMP, is designed for 5kv use (2400/4160Y and 4800 v delta systems) and 8kv use (4800/8320Y and 7200 v delta systems). Phase identification is positive at a glance, since cables are maintained in the same relative position along their entire length. Phases may be added or removed, and the system may be reinforced *without removing* ROECLAMPS from messenger! *Conductors may be replaced without tools* (except for splices and tapes).

Low impedance results in better voltage regulation — and the heat-dissipating properties of the Roebling system mean higher current-carrying capacity. Lightning protection and protection from falling tree limbs are provided by the strong copper-weld messenger, which runs the length of the system. Aluminum conductors come in 17 standard sizes and strand constructions to cover a broad range of applications. They are specially made with a greater number of finer strands to give extra flexibility. Standard insulation is extruded Roeplastic® P-11R7, although other types of extruded insulations are available, depending upon proposed usage.

The Roebling Aerial Spaced System featuring the ROECLAMP costs less, installs fast, gives optimum service and requires minimum maintenance. You can't afford not to investigate it! Your Roebling representative can give you a demonstration of the revolutionary new ROECLAMP—and will give you more facts about this remarkable system. Call him — or write Electrical Wire Division, John A. Roebling's Sons Corporation, Trenton 2, New Jersey.

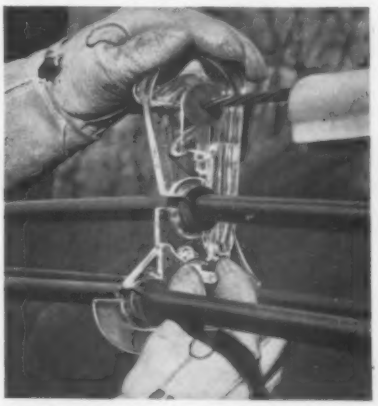
ROEBLING

Branch Offices in Principal Cities
Subsidiary of The Colorado Fuel and Iron Corporation

* Patent pending

One motion and ROECLAMP is on messenger and ready to receive conductors. Phase changes and repairs do not necessitate removal of clamp. ROECLAMP comes complete with grommets to fit messenger and conductors you order . . .

Note how easily conductors drop into place. Installation is measured in seconds, even with "boxing" gloves on. ROECLAMP is Plexiglas†, tests to over 1000-lb. breaking strength, offers outstanding weather resistance, best possible electrical properties . . .



35 ROECLAMPS are required every 1000 feet. Installation is completed by hand-tightening of nut. Not even a screw driver is required!

† Reg. T.M.—Rohm & Haas Co.

Alabama sells Housepower on installment payment plan

ALABAMA POWER Company has long recognized the fact that an active adequate wiring program is an essential element to any successful sales promotion, whether it be directed toward the residential, farm, or commercial market. As a consequence, attests General Sales Manager E. A. Wilson, much thought is devoted to methods of impressing upon each sales employee the importance of being "wiring conscious."

Backing up this program with action, APCO has incorporated into its merchandising program an added feature whereby adequate wiring for each appliance sold may be financed through the company along with the appliance itself. Merchandise salesmen know the essentials of adequate wiring and automatically sell it along with electrical appliances.

If the customer needs to re-wire his complete home (and a large percentage of them do), he may even finance that expenditure up to a total of $500 under the company's "Wiring Modernization Plan." Here APCO assumes the initial impact of the contractor's bill, allowing the customer to reimburse the company in small monthly installments, payable with his regular electric bills.

The plan has been widely publicized among dealers, electrical contractors, builders, architects, and electrical wholesalers. It involves no direct purchase from the company and is a "service" in the strictest sense of the word. Newspaper ads are used to remind the public that the company offers that service and to stimulate customer thinking on the importance of giving periodic consideration to wiring needs.

An attractive pamphlet, entitled "What Happens When Wiring Is At Fault," has been prepared for distribution among the customers of the company. To further stimulate the program, many dealers and electrical contractors are also using the pamphlet as an aid to their sales efforts in connection with getting the customer to install a modern up-to-date wiring system.

Adequate wiring is "part and parcel" of the work of the company's residential sales engineers, whose responsibilities are primarily concerned with promoting the use of electricity for residential heating and air conditioning. Every sales presentation made in this connection carries with it specific recommendations relative to the wiring needed to insure satisfactory operation of the equipment involved.

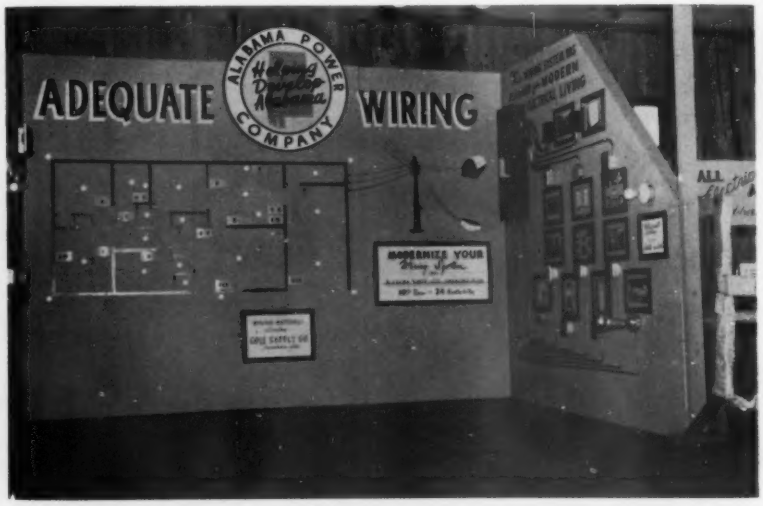
Company dealer sales representatives have also joined the promotion by carrying the adequate wiring story to the dealers in electrical merchandise within its service area. Sales training schools held for dealers and their salesmen afford the company a wonderful opportunity to stress the importance of adequate wiring. Almost inevitably dealer salesmen have encountered instances in their own contacts where inadequate wiring has caused them to miss a sale. An interchange of these experiences is most helpful in emphasizing the importance of selling wiring along with electrical merchandise.

Possibly the most effective work in the field of adequate wiring is done by the company's 51 home service advisors and 19 rural service engineers, who are in constant contact with its individual customers. Home Service advisors are given intensive training in the fundamentals of proper wiring and every advisor leaves her orientation period capable of making effective customer wiring layouts, of explaining the necessity for the wiring recommended, and presenting a forceful sales story to substantiate those plans.

Nearly 500 complete home wiring layout were made by these home service advisors during 1957. In addition, a large number of partial layouts were made in connection with planning and modernizing kitchens, laundries, and lighting arrangements.

The importance of adequate wiring is injected into an ever growing number of the discussions with groups of homemakers, home economics classes, home demonstration groups, and other similar organizations, discussions which reach nearly 160,000 electrical users who attended the 3,400 meetings conducted by our company home service advisors during 1957. Four special films stressing the need of adequate wiring have been purchased for use in these meetings. Here again the interchange of experiences that have resulted from the lack of adequate wiring on the part of customers is most helpful in creating an atmosphere favorable to the topics being discussed.

The adequate wiring promotion



This exhibit was developed for use in county fairs by Alabama Power Co. Left panel shows wiring typical of homes fifteen years ago, right panel demonstrates conventional wiring of typical modern homes. Main panel is a display of remote control wiring as it should be today.

CIRCLE F GROUNDING DEVICES

You can't buy better--why pay more?

SPECIFICATION GRADE

Complete line of 3-Wire Grounding Devices for Residential and Industrial Applications.

- Duplex Receptacles
- Single Receptacles
- Bakelite Caps
- Armored Caps
- Dryer and Power Receptacles
- Dryer and Power Cord Sets
- Range and Power Receptacles
- Range and Power Cord Sets

Your wholesaler has a complete range of sizes, types and capacities to meet your needs.

Circle F Grounding Devices give you everything you want—and save you money, too!

Figure it yourself! Circle F's complete line of grounding devices give you fast, easy installation, trouble-free service, rugged construction at low cost. Precision engineering and quality-controlled production are your guarantees of customer satisfaction and no call-backs. And Circle F Grounding Devices are available at Electrical Wholesalers everywhere for quick pick-up or delivery.

Any way you figure it . . . it pays to use high quality, low cost Circle F guaranteed wiring devices.

Next time you order grounding devices . . . say CIRCLE F and profit.

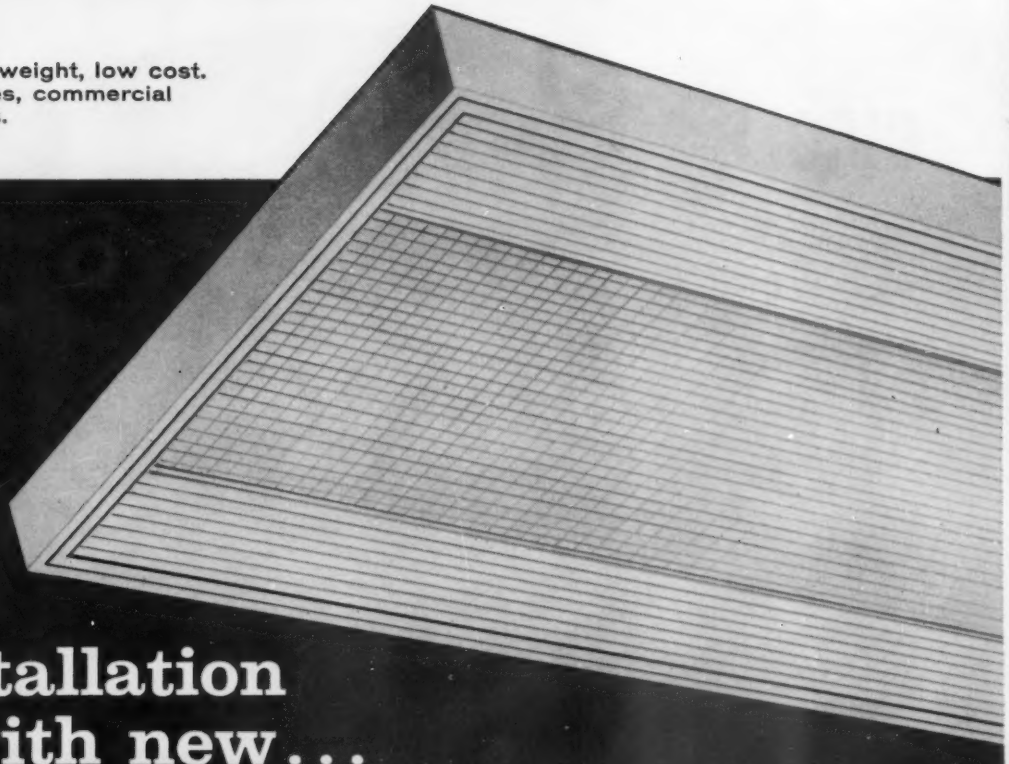
Circle F Mfg. Co.

TRENTON 4, NEW JERSEY

In Canada: Verd-A-Ray Electric Products Ltd., Montreal 9

For your wire requirements: Eastern Insulated Wire Corp. A Subsidiary
Box 591, Trenton, N. J.

CLEARTEX®... lightweight, low cost. Best choice for offices, commercial buildings and schools.



cut installation costs with new...

DAYLUME®

In a lighting fixture, it's the installed cost that counts! So consider what these Day-Brite DAYLUME features mean to you in time—and money—saved on the job:

Can be wired through sides, centers or ends to permit side-by-side, end-to-end or end-to-side installation.

Recessed back plate design assures snug alignment with ceiling.

Mounting straps with wing-nuts are furnished with all units.

Enclosures have *separable* hinges . . . hinge from either side.

Like *all* Day-Brite fixtures, DAYLUME units are shipped assembled, ready to install.

Equipped with separately fused CBM ballasts for added safety in event of ballast failure.

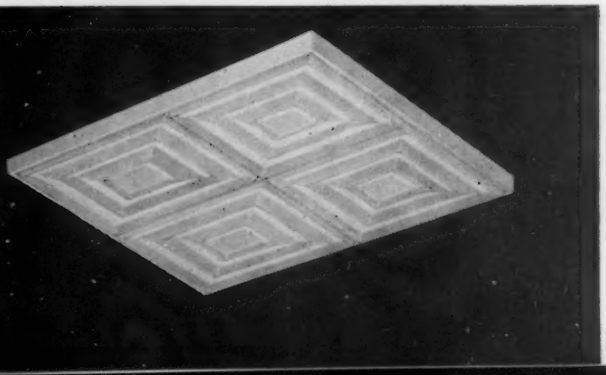
Just 3¼ inches *thin!* Recessed appearance with surface-mounted flexibility. Placement is not restricted by structural and mechanical components.

Six sizes. Widest variety of enclosures. Match Day-Brite recessed fixtures.

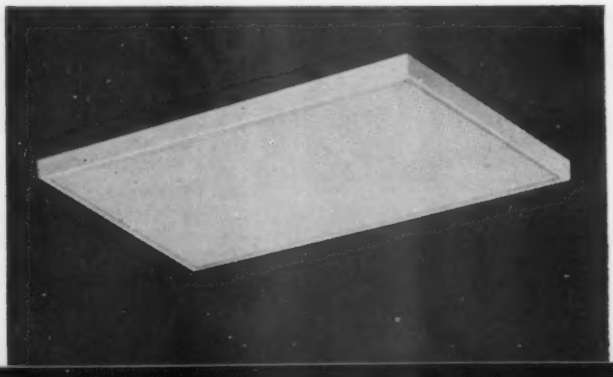
Glass enclosures are cushioned with vinyl gaskets to reduce breakage.

Plastic panels are completely framed. Frames have inner flanges for greater strength.

DAYTEX—clean, concentric square design adds pleasing accent to ceilings of stores, banks and auditoriums.



PATTERN 70® glass lens panel by Corning—high lighting efficiency for schools, private and general offices.



DAY-BRITE...the Contractor's Choice

surface lighting elements by

DECIDEDLY BETTER
DAY-BRITE
Lighting Fixtures

"Compared against the field, Day-Brite offers extreme labor savings"

...says JACK H. DISHER,
Southern Electric Co.,
Charleston, South Carolina

"When Day-Brite supplies the fixtures, all parts and components are there when you need them.

"What's more—they *fit*. They're sturdily built and engineered with installation problems in mind.

"When you line up Day-Brite fixtures, they *stay* lined up.

"We can afford to pay more for Day-Brite fixtures and give our customers the advantages of Day-Brite quality. It's easy to make up the small price differance on labor savings."

For free illustrated booklet on DAYLUME, call your Day-Brite representative listed in the Yellow Pages...or mail coupon.

Day-Brite Lighting, Inc., 6264 N. Broadway, St. Louis 15, Mo. • Day-Brite Lighting, Inc., of Calif., 530 Martin Ave., Santa Clara, Calif.

Z-89

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

Certified Lighting for a Better America

DAY-BRITE LIGHTING, INC.
6264 N. Broadway
St. Louis 15, Missouri

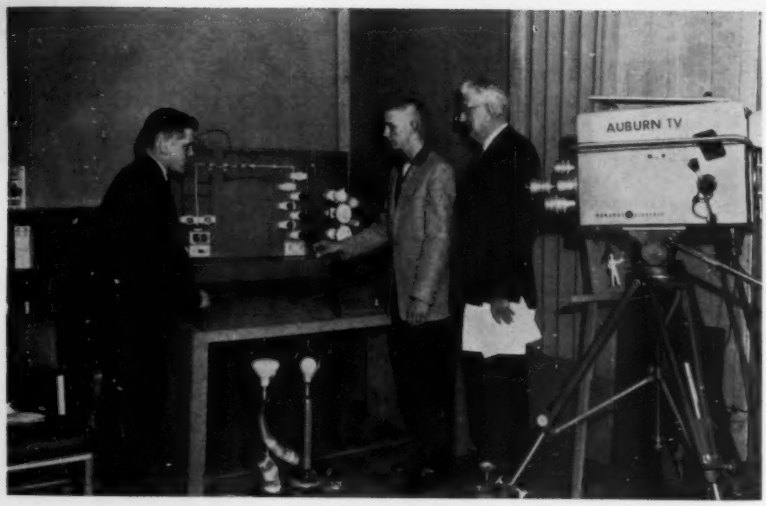
Please send _____ copies of Day-Brite's new illustrated booklet on DAYLUME surface lighting elements.

Name _____

Company _____

Address _____

City _____ State _____



The major portion of a 30-minute telecast commemorating Science Youth Day was devoted to an adequate wiring demonstration by Frank Eaton (center), high school senior and tenth consecutive winner from Alabama in the National 4-H Club Farm and Home Electrification Contest. E. C. Easter, at right, executive vice-president, Alabama Power Co., and Robert Bohan, production manager of the educational television network at Alabama Polytechnic Institute view the demonstration.

in the rural sections of the company's service area parallels to a large extent the work done by home service advisors in urban areas on a somewhat more expanded basis because of the nature of the general electrical loads involved. A thorough knowledge of the essentials of good wiring is a prime requisite for the rural service engineer who works directly with the 110,000 rural and farm customers of the company. Wiring instruction is given from the "ground up" beginning with regular classroom discussions on the subject with 4-H and FFA groups.

Summer refresher courses for 4-H leaders and FFA teachers are conducted in order that all may keep up-to-date with modern wiring practices. Here the National Electrical Code is the byword. Dealers in wiring needs are called on to furnish materials for the discussions and work closely with teaching rural service engineers. To build up the confidence of the dealers, rural service engineers call on them frequently reviewing their stocks of wiring materials and making recommendations.

One of the company's rural service engineers lectures one week during each semester to the future county agents and vocational agriculture teachers attending the state's land grant college on the fundamentals of adequate wiring. To make the discussions more vivid, the company has built a scale model house where students can actually install all of the wiring necessary for the farm home.

Lectures similar to this are also given before special groups throughout the company's service area, including rural communities, clubs, meetings of poultrymen and dairymen, and other similar organized sessions.

During 1957, rural service engineers made over 3,500 actual farm visits in connection with the installation of various types of electrical equipment. These afforded an excellent medium of presenting the adequate wiring story, as new electrical installations almost inevitably require additions to the farm wiring system. In many cases it became necessary to install pole-type metering in order that the customer might enjoy maximum benefits from electric service.

Rural service engineers are able to give specifications for this type of service, including the bill of materials for the equipment needed. Through these visits, rural service engineers have become widely known as the farmers' "consulting engineers" in so far as wiring practices are concerned and in many cases they are considered so by county agents, vocational agriculture teachers, and other agricultural leaders in the state.

Rounding out the Alabama Power Company's activities in behalf of better wiring practices, commercial sales engineers spend much of their time talking wiring needs with the 58,000 commercial customers of the company. Here again almost every installation of any consequence necessitates as a part of the sale, an adjustment in the customer's wiring system.

Commercial sales engineers have the responsibility of recommending to the customers those changes or additions necessary to assure satisfactory operation of the equipment involved. APCO's director of commercial power serves as secretary of the Alabama Association of Electrical Inspectors. In this capacity the company is able to maintain contact with the electrical inspectors throughout the area and is usually consulted when new wiring, municipal wiring codes, are being developed, or when additions are being made to existing codes.

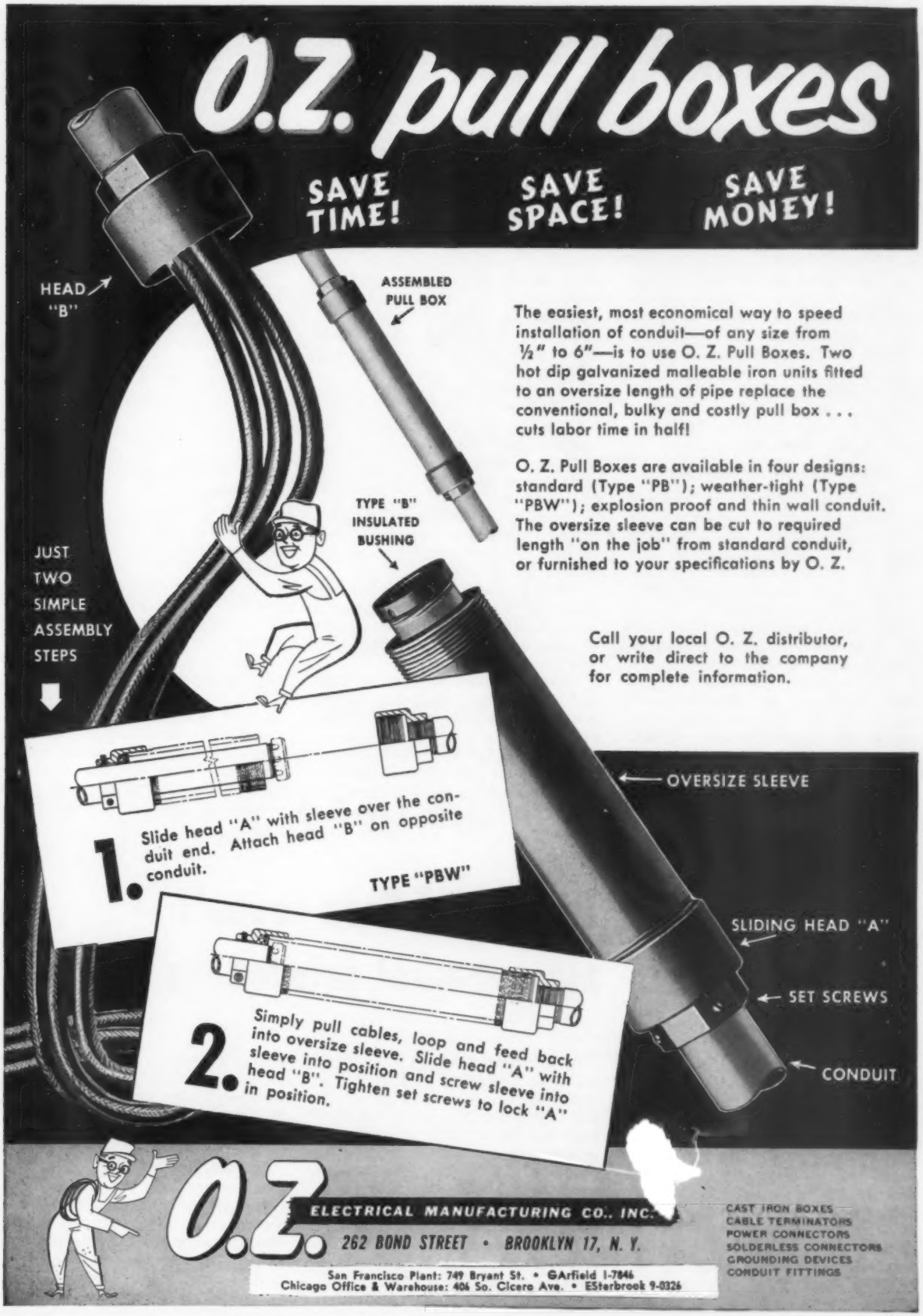
As a result of this activity several municipalities have already adopted minimum service entrance specifications of 100 amps for buildings of specified sizes. In addition to the director of commercial power, a number of company representatives in all sections of its service area belong to the Alabama Association and take an active part in the organization.

Housepower gains horsepower at Carolina Power and Light

HOUSEPOWER is gaining horsepower in the Carolina Power & Light Company service area. Adequate wiring was a vital part of the CP&L sales program in 1956 and 1957, and the tempo will be increased in 1958, reports R. S. Martin, Housepower Coordinator,

O.Z. pull boxes

SAVE TIME! SAVE SPACE! SAVE MONEY!


HEAD "B"
ASSEMBLED PULL BOX
TYPE "B" INSULATED BUSHING
JUST TWO SIMPLE ASSEMBLY STEPS
OVERSIZE SLEEVE
SLIDING HEAD "A"
SET SCREWS
CONDUIT
1. Slide head "A" with sleeve over the conduit end. Attach head "B" on opposite conduit.
TYPE "PBW"
2. Simply pull cables, loop and feed back into oversize sleeve. Slide head "A" with sleeve into position and screw sleeve into head "B". Tighten set screws to lock "A" in position.

The easiest, most economical way to speed installation of conduit—of any size from ½" to 6"—is to use O. Z. Pull Boxes. Two hot dip galvanized malleable iron units fitted to an oversize length of pipe replace the conventional, bulky and costly pull box . . . cuts labor time in half!

O. Z. Pull Boxes are available in four designs: standard (Type "PB"); weather-tight (Type "PBW"); explosion proof and thin wall conduit. The oversize sleeve can be cut to required length "on the job" from standard conduit, or furnished to your specifications by O. Z.

Call your local O. Z. distributor, or write direct to the company for complete information.

O.Z. ELECTRICAL MANUFACTURING CO., INC.
262 BOND STREET • BROOKLYN 17, N. Y.

San Francisco Plant: 749 Bryant St. • GArfield 1-7846
Chicago Office & Warehouse: 406 So. Cicero Ave. • ESterbrook 9-0326

CAST IRON BOXES
CABLE TERMINATORS
POWER CONNECTORS
SOLDERLESS CONNECTORS
GROUNDING DEVICES
CONDUIT FITTINGS

at Raleigh, North Carolina.

One of the most successful programs ever adopted by Carolina Power & Light Company to encourage adequate wiring was the Housepower Program which was introduced nationally in 1956. Happily enough it established for the company new contacts with groups whose support had never before been fully utilized.

Throughout 1956 the company's support of the program took the form of advertising in newspapers, and on radio and television. Direct contacts were made with groups such as electric leagues, home builders and contractor groups. Lists of entrants in the Housepower Contest were furnished to electrical contractors on an area basis for follow-up. The total number of full Housepower installations resulting from the follow-up was highly encouraging.

Housepower forums held

Then last spring, CP&L began a series of 20 Housepower forums for electrical contractors in its system area which extends into the two Carolinas. The forums were of six-weeks duration and were composed of two-hour meetings once a week. Training groups were held to 15 contractors in most cases to assure personal attention.

Unlike many electric utilities that employed college professors or others outside the industry to serve as forum leaders, CP&L picked eleven key men from its own sales force, put them through an intensive 60 hour Housepower training program, and gave them the job of conducting the Housepower forums.

Our planning was based on this theory: Company sales people most often work with contractors in the field; and, after all, getting the Housepower message to the people is a selling job. There followed the natural conclusion that sales training for the contractor should be handled by trained salesmen. At the same time, there would be a strong tie established between the company salesman and the contractor.

The forums continued through December 1957 with a total of 222 electrical contractors completing the training. Each graduate was furnished with visual sales aids and texts for telling a forceful Housepower story to the customer.

What has been the result of CP&L's participation in the Housepower Program? Company records reveal a very decided trend toward upgrading of residential wiring beginning in the early part of 1956. In January 1956, only 51% of new homes under construction in the company system area were wired for 100 amps or more. By January 1957, the figure had risen to 73%, and at the close of the year 1957, homes wired for 100 amps or more had averaged 83% of the total over a seven-months period.

Several electric leagues, made up of contractors who had the sales training, have grown up in the CP&L system as a result of the forums. They now actively promote Housepower locally, and are eager to take a more active part in national Housepower promotions sponsored by utilities and appliance and electrical equipment manufacturers.

Letters from contractors reflect their enthusiasm about the forums:

"It is my thinking now that you have given the electrical contractors something which they should have had many years ago; a course in salesmanship. . . "

"I am better prepared to show my customers how they can benefit from a better planned electrical system . . . "

"This course helps me make the customer, both of a new or old home, see the need and advantage of adequate wiring, and makes him less price conscious . . . "

"Not only does this course help sell wiring jobs, but has given me ideas to use in selling appliances . . . "

"Since completing your Housepower training last July, I haven't put in any wiring job less than 100 amps . . . "

Housepower better known

Housepower awareness has developed outside the industry in CP&L's service area, too. Financial institutions have asked for specifications on adequate wiring, or full Housepower, expressing the intention of requiring these standards in all homes approved for loans.

Contractors advise that the recognition factor of the term Housepower is high. They report further that they are selling wiring for the first time more on adequacy than on price.

CP&L is continuing its successful forum program in 1958, realizing that it has only scratched the surface in this important field. In Wilmington, N. C., for instance, the first 17 contractors contacted last year signed up for the forum, immediately filling the class. Many others in the city, and elsewhere, are anxious to get in on the training program.

In addition to conducting forums CP&L will hold training sessions of a more technical nature as a follow-up to the sales training. Many contractors, especially in the smaller towns in the company service area, have expressed a desire for the technical instruction.

Over seven thousand new homes are expected to be built in the CP&L service area in 1958. Every one will be a Housepower prospect. Under the Housepower banner, and working with the allied group, Carolina Power & Light Co. embarks on a year filled with great promise in adequate wiring.

Potomac Edison reveals mass-market promotions

A CONTINUING SERIES of system-wide, mass-market promotions to boost the use of electricity in the home by promoting the benefits of electrical living, will be projected extensively in 1958, reports the Potomac Edison Co., of Hagerstown, Md.

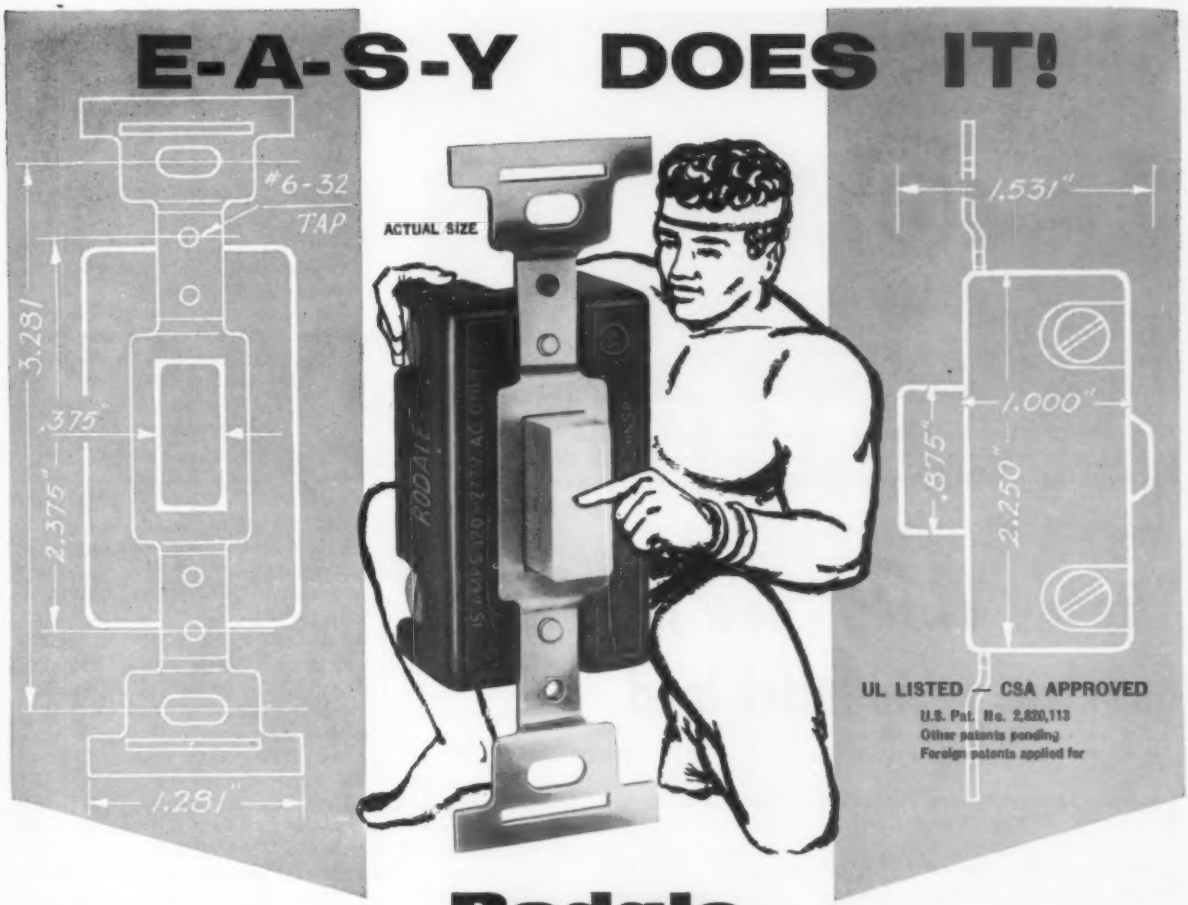
The program will center around three major parts:

1. **Full Housepower,** the ability of the home wiring system to economically supply electricity for all electrical uses, present and future. Full Housepower is a nationwide promotion initiated by the Edison Electric Institute in 1956. Since that time, the program has been widely accepted by the electric utility industry.

2. **Certified Wiring** is Full Housepower with the proper number of carefully planned circuits of correct size wire for: appliances needing separate circuits or; circuits with the proper number of outlets conveniently located. This

(Continued on page 140)

E-A-S-Y DOES IT!



Rodale

Sets The Pace With The

E-A-S-Y ACTION... E-A-S-Y TO INSTALL

"B" Touchette®

No knob to turn. No toggle to flip. Now, there's a switch designed for today's *push-button living*. It's "B" Touchette, the touch switch with feather-light operation. Not only that . . . but when you specify Touchette for new construction or remodeling jobs, you have easy installation, as well. Touchette measures just *one inch* in depth . . . allows for quick, simple installation . . . even in boxes where several wires enter.

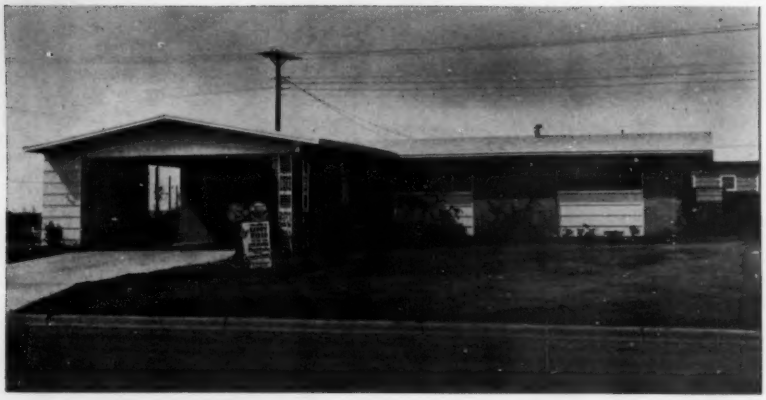
Touchette needs no special wiring . . . fits standard outlet boxes and toggle wall plates and operates on full line voltage. Rated 15A—120—277V, it withstands motor loads up to 80% of rated capacity.

All these features . . . and "B" Touchette is the least expensive touch switch on the market!

Available in single pole, double pole, 3-way and 4-way models. Brown or ivory touch button.

Sold only through electrical wholesalers.
Or for further information and prices, write: S4

Rodale manufacturing co., inc. emmaus, pa.



West Texas Utilities Company provides a five-foot sign for the front yard of new homes meeting the specifications of their Reddy Wiring program. Other builder benefits include TV, radio and newspaper ads.

"Reddy Wired" new homes increase residential load

G. C. OSBORNE, Jr., Lighting Supervisor at West Texas Utilities Co., Abilene, Texas, relates the company's adequate wiring promotion efforts directed toward homes under construction:

Our program is called "Reddy Wiring" and is a builder cooperative plan. We patterned our promotion after the "Reddy Wiring" program originated by Houston Lighting & Power Co.

We set up certain wiring specifications and for each builder who wired his home to meet these minimum specifications, our company provided radio, newspaper and television advertising plus a five-foot sign placed in the front yard, and cards pointing out electrical features in the home.

The wiring program was promoted in our two largest towns, Abilene and San Angelo, during 1957. The results were very gratifying. Out of approximately 800 new homes built in these two cities during 1957, 355 were "Reddy Wired."

We plan to expand the program into our smaller towns during 1958. We are also formulating a program directed at modernizing wiring in old homes.

In addition to our "Reddy Wiring" program, we have presented Housepower and Live Better Electrically programs and literature to various civic clubs, service clubs, women's clubs, school home economic classes, science classes, and others.

We are extremely pleased with the results so far of our program on a local basis. The national programs Live Better Electrically and Housepower have been a great help in getting our story across.

Low Housepower we feel, is the most serious problem facing electric utilities companies in their effort to increase residential load.

Minimum specifications for Reddy Wiring are as follows:

For single phase electric service: (3-conductor)

Minimum service entrance equipment capacity: 100 ampere, 3-conductor entrance to multibreaker. This entrance shall serve all circuits listed below under requirements (lighting and appliance wiring) and (special circuits).

Lighting and appliance wiring: Convenience outlets to be located so that no point along the floor in any usable wall space in any room is more than 6' from an outlet in that space. (Subject to change to National Electric Code.)

Special circuits: Necessary wiring and outlets will be installed to permit use of the following electrical equipment: electric dishwasher and disposal unit, electric range (230 volt), electric dryer (230 volt), clothes washer.

Two outside weatherproof outlets, one in front and one in back of house for outside electric appliances, power mowers, hedge clippers, etc., and in addition one outside outlet for backyard floodlight.

Kentucky promotes new home wiring and modernization

ADEQUATE WIRING promotion plans in the new home market and Housepower promotion plans in the modernization market at Union Light, Heat & Power Co., of Kentucky, are outlined by Staff Sales Assistant Robert W. Neel, of the parent organization, Cincinnati Gas and Electric Co.

(a) We furnish complete blueprint marking service and wiring specifications to anyone building a new home, at no cost.

(b) If he wires according to the plan, we furnish free, an illuminated house number for the house.

(c) We urge electrical contractors to advertise in the classified section that they specialize in Adequate Wiring. We pay $5.00 for each Adequate Wiring Certificate awarded those contractors who advertise, toward payment for his ad.

(d) We furnish currently, following personnel for the National Wiring Bureau.

(1) Member of the Residential Plan Committee.

(2) Member Committee for National Wiring Conference for 1958 in Detroit.

(3) Member of Certification Procedures Task Committee.

(e) We have frequent displays on Adequate Wiring in our various offices.

(Continued on page 138)

MORE LIGHT for the MONEY with the NEW POWER-GROOVE INDUSTRIALS by SMITHCRAFT

Up to 2½ times higher lighting levels can be obtained with a given number of fixtures *at a lower initial cost per footcandle*. Smithcraft and Power-Groove are now combined to give employees a better, more productive see-level and to save employers *real money*.

Smithcraft Power-Groove Industrials are beautifully constructed industrial units that utilize the very high lumen output of the new Power-Groove lamps to provide real economic advantage along *with comfortable lighting*. These units, designed for top value and for very long-term use in today's factories, mean that you can save between 5 and 20% on your initial lighting investment. Ask your Man from Smithcraft.

POWER-GROOVE INDUSTRIALS *by Smithcraft are quickly and economically mounted, individually or in continuous rows, using any conventional method. Reflectors, ribbed for extra strength, are available in Smithcraft White Porcelain Enamel or in Smithcraft Bonderite and Baked White Enamel Finish. Louvers for 30° lengthwise shielding are optional.*

Smithcraft POWER-GROOVE and MONITOR Industrials feature:

- Ribbed reflectors for extra strength.
- Scientifically-designed collared apertures.
- Reflector couplings are plastic inserts, sealing light leaks and lining up reflectors in continuous row mounting.
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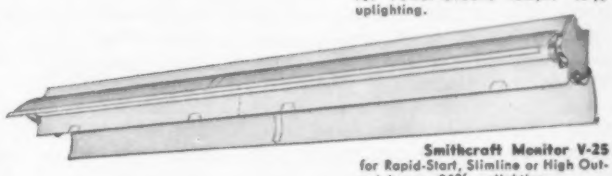

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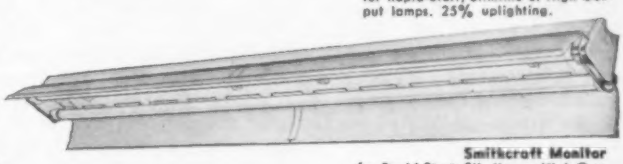

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Review avenues of approach in adequate wiring program

◆ NEARLY 300 wiring promotion executives and industry leaders attended the National Wiring Bureau's annual conference, recently, to report what's going on and what's ahead in the field of wiring promotion. The tightly-knit, day-and-a-half program included talks by electrical industry leaders, reports on various highly successful local promotions of residential and commercial wiring, a panel discussion of the Medallion Home program, and presentation of the Fourth Annual *Look Magazine* awards.

If one theme can be said to have emerged from the diversified program, it was that despite past successes, the biggest wiring promotion job still lies ahead if America's wiring is to keep pace with its lustily growing use of electricity.

Big job still ahead

This point was made in the opening moments of the conference by the keynote speaker, Frank S. Roby, vice-president, Sales, of the Square D Company, and a vice-president of NEMA. He said, "These are electrifying years . . . residential power consumption has been climbing at the rate of more than double every ten years and the upward trend remains very strong. A logical question is whether or not such a trend can be continued without a radical change in wiring systems."

Mr. Roby cited figures from a survey conducted by the Chicago Metropolitan Home Builders Association showing that only a few years back, in 1950, the cost of wiring and fixtures in a $10,000 home cost only 2% of its selling price, while painting and decorating ran 4%. Recently, he continued, as a result of industry efforts at wiring proomtion, the figures for 1956, 1957 and 1958 were 3.7%, 4% and 4.3% respectively.

He stressed that no one should become satisfied with these figures for it is evident that home wiring is still not keeping pace with increased appliance usage. During the years 1941 to 1956, the number of wired homes increased only 75%, he said. During the same 15-year interval, sales of home electrical appliances increased 450%. Thus, the rate of growth of appliance sales is 6 times the rate of growth in new homes. The great bulk of these appliances must, therefore, be appearing on the poor, overloaded, wiring systems of the homes built prior to 1941.

Peak heating-cooling loads of the future may well exceed the entire power load of today, he continued, and America will soon be installing such new appliances as electronic ranges, electronic dust collectors, electro-luminiscent panels and waterless laundries, which will further increase power use in the home.

Promotion essential

Referring to the competition for the consumer's dollar that the electrical wiring and appliance industry must face in such things as swimming pools, automobiles and winter vacations, Mr. Roby said he was confident that the American homeowner, properly approached, would put electrical living at the top of his list. But he is in a poor position to make this decision unless he is made fully aware of the important place which electrical power has in all phases of his activity. "That," said Mr. Roby, "is the job which you people in this room must get done."

Fourteen *Look Magazine* awards and citations were made at the Conference to organizations which conducted the best local campaigns to encourage improvements in the wiring of homes and business establishments.

The awards were in four categories: community service awards to utilities with over 250,000 meters, and to those with less than 250,000 meters; sales promotion awards to electrical contractors, and merchandising achievement awards to electrical distributors. Judging was on the basis of presentations submitted by each entrant including such material as tearsheets of advertisements, pictures of store and outdoor displays, descriptions of radio and television campaigns and evidence of cooperation with other local electrical industry groups.

Luncheon speaker at the Conference was E. O. George, vice-president of sales, Detroit Edison Co. He commented on the title of his speech, "Looking Back Into The Future," saying that he chose it on the principle that what is past is prologue, particularly in the wiring industry.

Wiring, Mr. George pointed out, has been with us ever since electricity was first generated. But it had no glamor and so went unnoticed, even by sales and promotion people in the industry. The turning point came, he said, with the introduction of the electric range, the first generally accepted heavy-duty household appliance. But it was more than that—it was also a good electrical appliance that would whet the user's appetite for more electrical living appliances. It was what the electrical industry needed to help it grow.

What industry needed

This range crisis, Mr. George said, was a stimulant to the wiring industry for it focused attention on wiring and speeded up progress by forcing improvements in methods, materials and codes that advanced the wiring industry 20 years almost overnight.

Milton Allen, vice-president of sales, Philadelphia Electric Co., and a member of the National Wiring Bureau's Executive Committee, reported to the conference the results of a recent survey made by NWB to determine the extent to which electrical contractors are engaging in residential wiring modernization work.

R. S. Martin, Housepower coordinator for Carolina Power & Light Co., Raleigh, N. C., gave an account of his company's experience with the Housepower Forum in a talk entitled, "How Housepower Forums Win Friends and Build Business."

An electrical contractor's experiences with the Housepower program, operated through Cincinnati Gas & Electric's Wire-On-Time plan were described by John Waitas, Bond Electric Service Co., Norwood, Ohio.

Commercial and institutional wiring was the subject of one complete session. The subjects covered included "The Commercial Wiring Market," "How An Electrical Contractor Promotes and Sells in the Commercial Wiring Market," and a visual presentation of the Bu-

(Continued on page 137)

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THAT'S what contractors are saying about the new Murray "MP" breaker.

After years of development, Murray has succeeded in putting all the advantages of its original *fully magnetic* breaker into the new, competitively priced "MP".

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Profit in maintenance service

By S. W. Ellis

This article should be especially helpful to the following readers:

Electrical Contractors ✔
Electric Utilities
Electrical Wholesalers
Electrical Inspectors
Consulting Engineers
Industrial Engineers

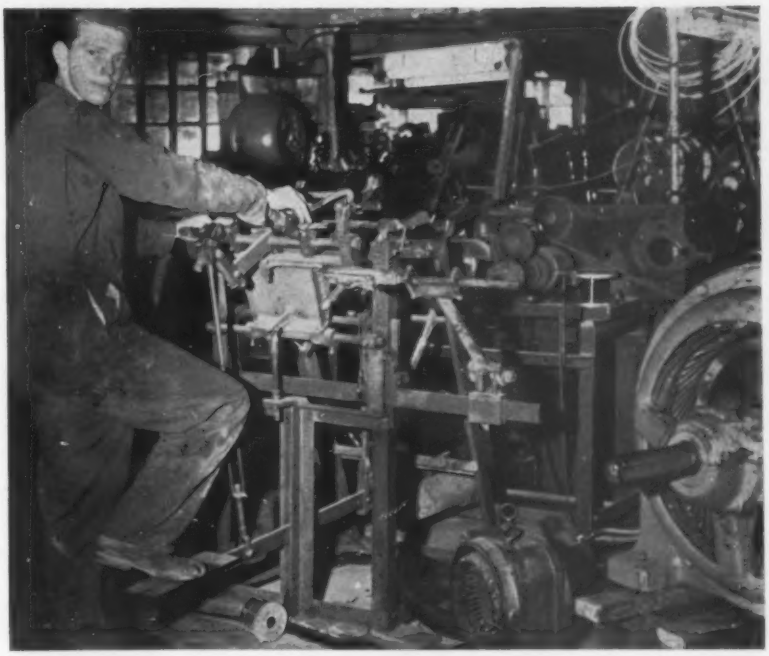
◆ KEEPING 3,000 motors running in saw mills, wood-working plants, and utility plants is a profitable and expanding activity for the Illinois Electric Co., Hot Springs, Ark. To good equipment, advertising, and salesmanship, Owner Frank Anderson gives credit for his fast growth.

Starting eight years ago as a one-man operation, he now heads an electrical contracting and maintenance organization that contrives to make profits from varied activities that cover general electrical contracting, maintenance, and electrical appliance repairs.

Much of his far-flung growth, reaching into several states, comes from display advertisements in the yellow classified pages of small-town telephone directories. These reach the saw mills and wood-working plants he wants to contact. The plant owner, often not knowing where he can get fast repairs, turns to the telephone directory and finds Anderson's advertisement. The contact often leads to another maintenance customer.

Another profitable advertising medium for him is the radio, which he uses for promoting every phase of his electrical maintenance and repair service.

His most profitable current operation, in the wide variety of electrical services he offers, is installing and maintaining modern chippers and debarkers in mills that supply paper manufacturing plants with raw material. He practically has a monopoly in a wide territory, his service trucks going almost to the Gulf Coast for selling, installing, and maintaining this equipment.



Illinois Electric Co., Hot Springs, Ark., has over $50,000 invested in machinery and tools. This taping machine was made in the shop, and is highly valued as a time saver.

Anderson is well prepared to serve his industrial customers. The building he constructed for efficient operation of a general electrical contracting business houses $50,000 worth of machinery and tools, including a machine shop.

Although Anderson has a heavy investment in machinery and tools, he maintains that this investment would be much higher if he and his crew did not make some of the equipment they use. To aid his electricians and mechanics in conserving their time and efficiency, he creates or alters machines and tools. All of the winding equipment was made in the machine shop. A taping machine that would cost $1,800 to buy was built in the shop at a cost of $200. A coil spreader was made for one-third of the cost of a factory model.

Anderson insists that his good equipment saves manpower and gains the confidence of the mills and plants he serves. Some of these would have their own maintenance crew if he were not equipped with machinery, men, and his ability to convince prospects that his maintenance service is reliable and economical.

In maintenance work, Anderson prefers contracts with customers who do not have their own maintenance crew. He wants to do his own designing for new installations, wherever possible. Having done the designing, he is familiar with the installation. "Some customers want to do their own designing," he said. "I don't argue with these, but I often have to stand by and watch some blunders being made, which I will be called upon later to correct.

"When we do the designing and installation, we try to impress the customer with the fact that we know our business, and are equipped to give him the service he needs. We play up our machinery, tools, modern plant, and

(Continued on page 140)

Basic motor control circuits

By M. R. Brice

Manager, Service Sales Div.
Cutler-Hammer, Inc.
Milwaukee, Wis.

This article should be especially helpful to the following readers:

Electrical Contractors ✔
Electric Utilities ✔
Electrical Wholesalers
Electrical Inspectors
Industrial Engineers ✔
Consulting Engineers ✔

◆ *This is a continuation of the discussion on this subject which began in the March issue of Electrical South.*

Jogging control

With normal "Start" - "Stop" pushbutton control it is possible to inch or jog the machine a small amount by pressing the "Start" button and then very quickly pressing the "Stop" button, but it is not very convenient to do it that way. If jogging is to be done frequently, a separate "Jog" pushbutton should be used.

Fig. 9 shows the preferred jogging connection, using a jog relay. Pressing the "Jog" button will energize coil "M" and cause the motor to run, but only as long as the "Jog" button is held down. However, pressing the "Start" button will pick up control relay "CR" which maintains itself thru one contact while picking up contactor "M" thru the other "CR" contact, the motor continues to run after the "Start" button is released. Then pressing the "Stop" button opens the circuit to both the "M" and the "CR" coils, stopping the motor.

Another type of jogging control, a little less convenient than the first, is shown in our Fig. 10. Here we use a special "Stop" pushbutton element having a locking ring around the button. When the locking ring is turned to "Run," the "Stop" button contacts are closed and pressing the "Start" button will pick up "M" which maintains itself thru the "M" interlock and thru the "Stop" pushbutton. However, if we turn the ring to "Jog," the "Stop" button contacts are held open. Then "M" cannot maintain itself, the motor runs only while the "Start" button is held down, and the "Start" button can be used for jogging.

Our diagram Fig. 11 shows still another jogging circuit, one which is not recommended for most applications, although it is sometimes used for spinning frame controllers. In this case we have a "Jog" button with normally closed contacts in series with the "M" maintaining interlock, and normally open contacts, operated by the same button, in parallel with the "Start" pushbutton.

Pressing the "Start" button of course picks up the "M" contactor which then maintains itself and the motor runs. However, if we press the "Jog" button to pick up "M," we have broken the maintaining circuit thru the "M" interlock. If we then release the "Jog" button slowly there is enough delay between the opening of one "Jog" button contact and the clos-

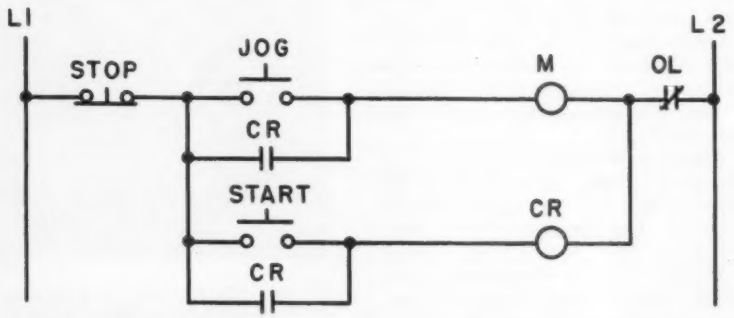


Fig. 9—Preferred jogging control connection using a jog relay.

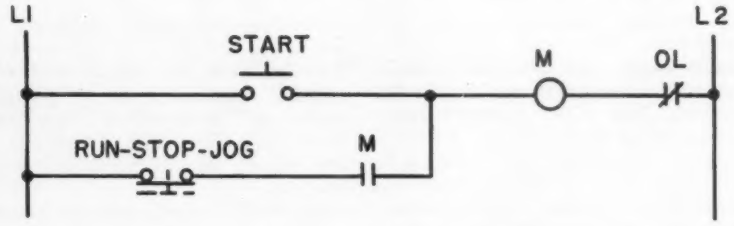


Fig. 10—Another type of jog control using latch down push button.

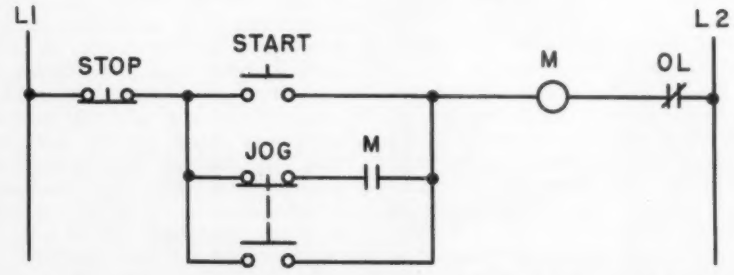


Fig. 11—This is still another type of jogging control. The jog button has normally closed contacts in series with "M" maintaining interlock. This control is not recommended for most applications.

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ing of the other so that "M" will have time to drop out, the "M" interlock will open, and we get good jogging operation.

But, if we release the "Jog" button quickly the normally closed contacts may complete the maintaining circuit before the "M" interlock has time to open, and the motor will continue to run when we don't want it to. On a metal forming press or a machine tool this could be very dangerous to men and machines.

On a spinning frame it is not likely to be dangerous, but it is annoying. This malfunction is more likely to happen on standard duty pushbutton stations than on the larger heavy duty stations, but it can happen with any of them, and we do not recommend the use of this circuit. It is much better to provide a jogging relay as shown in our first example, (Fig. 9).

Sequence interlocking

Sometimes it is important that one motor should not be able to run unless another motor is running, as in the case of a conveyor or a cleaning, blending, and picking line. This can be accomplished easily by using electrical interlocks on the starters as shown on our next diagram (Fig. 12).

This represents a system of three conveyors, with material flowing from conveyor number 3 to number 2 to number 1. If conveyor number 1 should stop with 2 and 3 running, material would of course pile up. We can prevent this trouble by proper sequence interlocking of the controller.

The starter for conveyor number 1 operates under a conventional three wire control system, so number 1 can be operated whether 2 and 3 are running or not. However, we add an extra normally open electrical interlock to the contactor 1 M of starter number 1 and we connect the 1 M interlock in series with the "Stop" button of starter number 2.

Thus the coil of 2 M cannot be energized unless 1 M is closed, and conveyor number 2 cannot run unless number 1 is running. If number 1 should stop for any reason—voltage failure, pressing the "Stop" button, or tripping of the overload relay, number 2 will stop also, to prevent a pile up of material.

In the same way, starter number 3 is interlocked with number 2. The system must be started by pressing "Start" buttons 1, 2, and 3 in that sequence. It can be

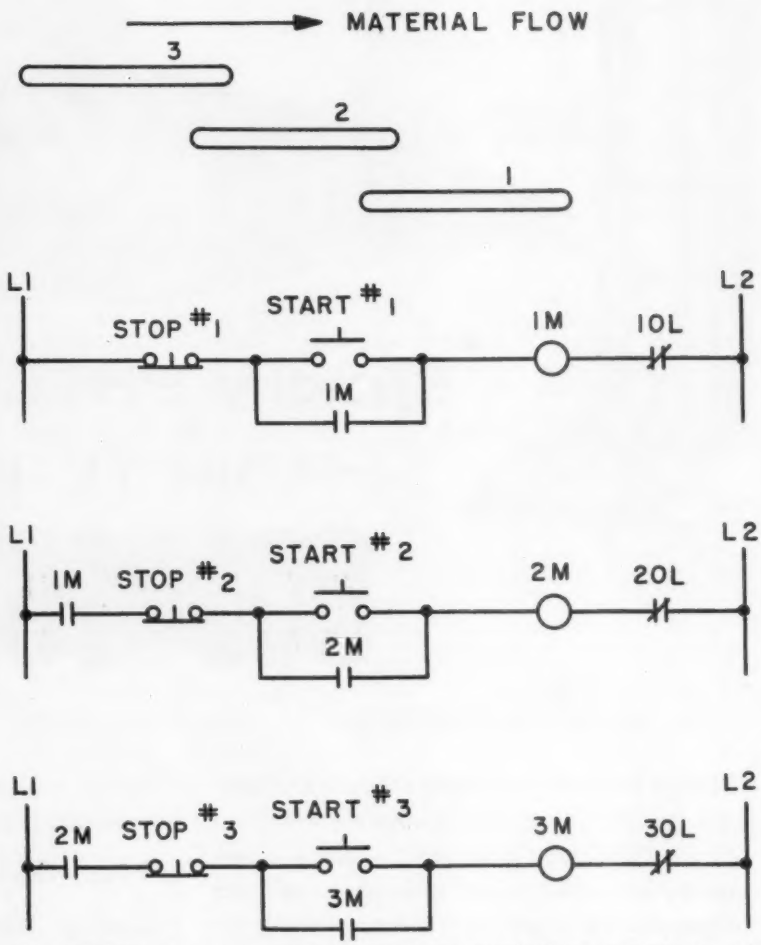

Fig. 12—This is an example of sequence interlocking control; in this case it applies to three conveyors. #2 can operate only if #1 is functioning; similarly #3 can operate only if #2 is in operation.

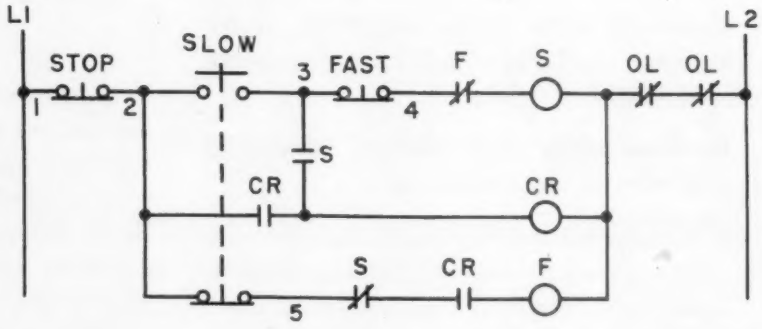

Fig. 13—The sequence compelling control shown here applied to a two speed machine compels operator to start at the slow speed.

stopped in the reverse sequence to clear the conveyors, or all three can be stopped at once by pressing the number 1 "Stop" button.

Note that the scheme shown keeps the individual starter circuits separate, each behind its own disconnect switch and fuses. We have seen interlocking circuits created by inexperienced people with power and control circuits of separate starters tied together. These would work under normal conditions but would fail on the blowing

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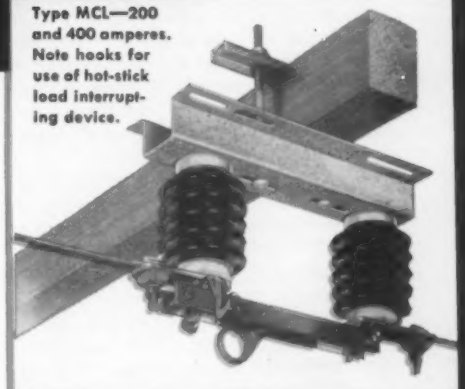

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of a fuse or the tripping of an overload relay.

We strongly recommend keeping the circuit clean cut as shown in our diagram. In most cases the extra electrical interlock required can be purchased as an inexpensive standard assembly to add to a starter you may already have.

Sequence compelling control

Another interesting circuit, shown in Fig. 13, is the sequence compelling circuit sometimes used with two speed a-c motors to compel the operator to start at slow speed. If the motor is stopped and we push the "Fast" button, nothing will happen, for there is no circuit established to either the Slow contactor "S" or the fast contactor "F." If we push the "Slow" button we do energize the coil "S" picking up the Slow contactor and causing the motor to run at slow speed.

The "S" normally open interlock then closes, energizing the coil of the control relay "CR." One contact of "CR" maintains the relay after the "Slow" button is released, and the "S" contactor is maintained thru the "CR" contact and the "S" normally open interlock. The coil of the Fast contactor "F" is not energized, even though the "CR" contact is now closed, because the normally closed interlock on "S" is now open.

If we now push the "Fast" button, with the motor running at slow speed, we open the circuit to the "S" coil dropping out the "S" contactor. The "S" maintaining interlock opens, so that "S" does not pick up again when we release the "Fast" button. "CR" continues to maintain itself. When "S" drops out, its normally closed interlock establishes a circuit thru "CR" to the "F" coil and the motor runs at fast speed. So we can transfer from Slow to Fast, but we cannot start from rest directly at fast speed.

When running at fast speed we can transfer to slow speed by pressing the "Slow" button. Opening the normally closed contact of the "Slow" button drops out the "F" contactor, closing the normally closed "F" interlock so the "S" contactor can pick up thru the normally open contacts of the "Slow" button. Pushing the "Stop" button, or tripping of either overload relay "OL," or a power failure, clears the entire system and the motor stops.

The above mentioned control schemes are the most widely used basic motor control circuits and appear in the majority of your applications. Many of the more complicated motor controllers are made up of combinations of these or similar circuits. A thorough understanding of these few fundamental circuits should be very helpful to you in the application of electric motor control equipment in your plants.

Utility group holds session on electric space heating

◆ HEATING specialists and sales managers from 14 utility companies spent a week in New York recently learning more about the market for electric space heating, how to calculate electrical space heating requirements, and how to get more heating load on their company's lines. The space heating school was held by Ebasco Services Sales and Public Relations Department for its utility company clients.

Instructors from Ebasco and some of the leading manufacturers of electric space heating equipment discussed basic heating terms and definitions, fundamental principles of heating, how to calculate heat losses, design and operating principles of heating equipment on the market today, training salesmen, working with allies, using promotional materials and how to beat competition.

N. A. Ferracci, of Ebasco, discussed the various types of heating systems in present day use and reviewed the fundamental principles of heating.

Lowell Mast, director of engineering for Electromode—a manufacturer of resistance heating equipment—presented "Heat Loss in Everyday Language," a 90-minute slide presentation developed by his company to explain to dealers and electrical contractors how to estimate heat losses.

Simplifying design

Designing electric heating installations can be considerably simplified with experience and by using charts available from several of the leading manufacturers, Stuart Forsyth, manager of electric heating for homes, Westinghouse, told the group. After reviewing design principles and pointing out the many types of electric resistance heating devices on the market today. Mr. Forsyth demonstrated several methods of designing installations.

A thirty-minute tour of General Electric's heat pump production facilities in Bloomfield, N. J., was the highlight of a day-long session on designing heat-pump installations and promoting the heat pump. Paul O'Neill, manager of utility contacts, Weathertron Department of General Electric, explained in detail how manufacturers compute requirements for resistance heating elements to minimize the effect on utility system demands.

Heat for schools

Schools, stores and manufacturing plants are vast potential markets for electric space heating, said Fred Krieser, general sales manager of E. L. Wiegand Co., manufacturer of Chromolax heaters. Many school buildings scattered throughout the North Central Region are now using electric heat. Within the last year, two have been placed in operation in New Jersey.

Mr. Kreiser pointed out that electrically-heated schools are cheaper to build and cheaper to operate from the standpoint of janitorial and fireman service and that these cost savings generally outweigh any differential between the cost of electricity and the cost of other fuels. Electrical contractors, architects and engineers who often have great influence in the design of schools, factories, and stores should be presented the facts about electric heating at special meetings arranged by utilities and manufacturers, he urged.

Ebasco's M. G. Kennedy demonstrated how to develop and use utility promotional materials.

Stanley Aronson, general sales manager, Berko Electric Manufacturing Corp., pointed out that people promoting electric heat often ignore or fail to emphasize efficiency in electric heating sys-

(Continued on page 102)

No. 4 in a series

Right off the Wire

Power for earth satellites could be supplied by a new chemical battery that uses a dye to convert sunlight into electricity.

&

A new bearing metal of tin and aluminum is said to combine the bearing qualities of one with the light weight of the other.

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Users of High Voltage cables should note that high molecular weight polyethylene can be expected to have a voltage life about seven times that of standard polyethylene. (From paper on Dielectric Strength and Voltage Life of Polyethylene, presented at AIEE Winter General Meeting, February 1958, by Messrs. Hunt, Ware and Koulopoulos of Simplex.)

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A new, automatic door opener is installed overhead, like a door check, and requires no complex, under-floor wiring. It can be installed in a few hours.

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In a new cook stove the heat is generated in the utensil by putting it in a magnetic field. No heat is wasted and spilled food does not burn. It is said to be faster than ordinary electric stoves.

&

The "cage zone" melting system has proved successful in purifying niobium. Under high vacuum the metal is melted by high frequency current and the impurities separate to be cut off later.

&

A vinyl lining material for swimming pools of masonry or wood is in the form of sheeting with an adhesive back that sticks to the sides and assures complete waterproofing.

To meet the growing demand for power by industry, Simplex has installed new equipment that allows cable cores of greatly increased diameters to be armored with CONDEX, the interlocking armor tape made by Simplex since 1924.

&

Printed pages can actually be made to talk by means of a Japanese invention. The back of the paper is treated like magnetic tape and produces recorded sounds when a reproducing head is passed over the printed words.

&

Further information on these news items and on Simplex cable is available from any Simplex office. Please be specific in your requests.

&

A new, thirty-nine-passenger bus for intercity service is claimed to have many advantages. It has a flat floor (no step-up to seats), a "recreation area," lavatory, reclining seats and air suspension.

&

The size of electrical components may be further reduced by a process for putting tiny germanium transistors into printed circuits.

&

Buildings are being erected with the use of balloons instead of derricks.

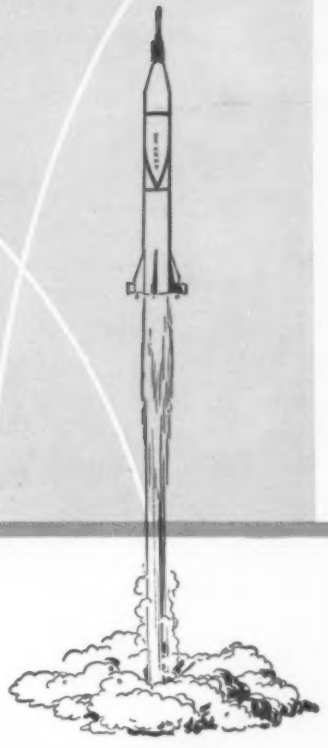
&

A method of projecting color pictures on a screen from black and white slides has been discovered.

&

An acknowledged leader of the cable industry in research and manufacturing skills, Simplex scientists and engineers present technical papers on a variety of subjects of interest to users of insulated cables. A list of papers read before the AIEE and other associations will be sent on request.

"the American manufacturers of transoceanic telephone cables"



Underwater nerves take the "miss" out of missiles

Test rockets fired from the U. S. Air Force Test Range in the Bahama Islands are tracked electronically from a series of check points along their routes. This close observation detects the slightest variance from the missiles' intended flight path. The vital communications link for this work is a 1400-mile Simplex submarine cable to Puerto Rico — a product of the world's most modern techniques in under-water cable manufacture.

For high voltage power transmission or the most exacting communications cables, Simplex' research, engineering and manufacturing facilities are at your service.

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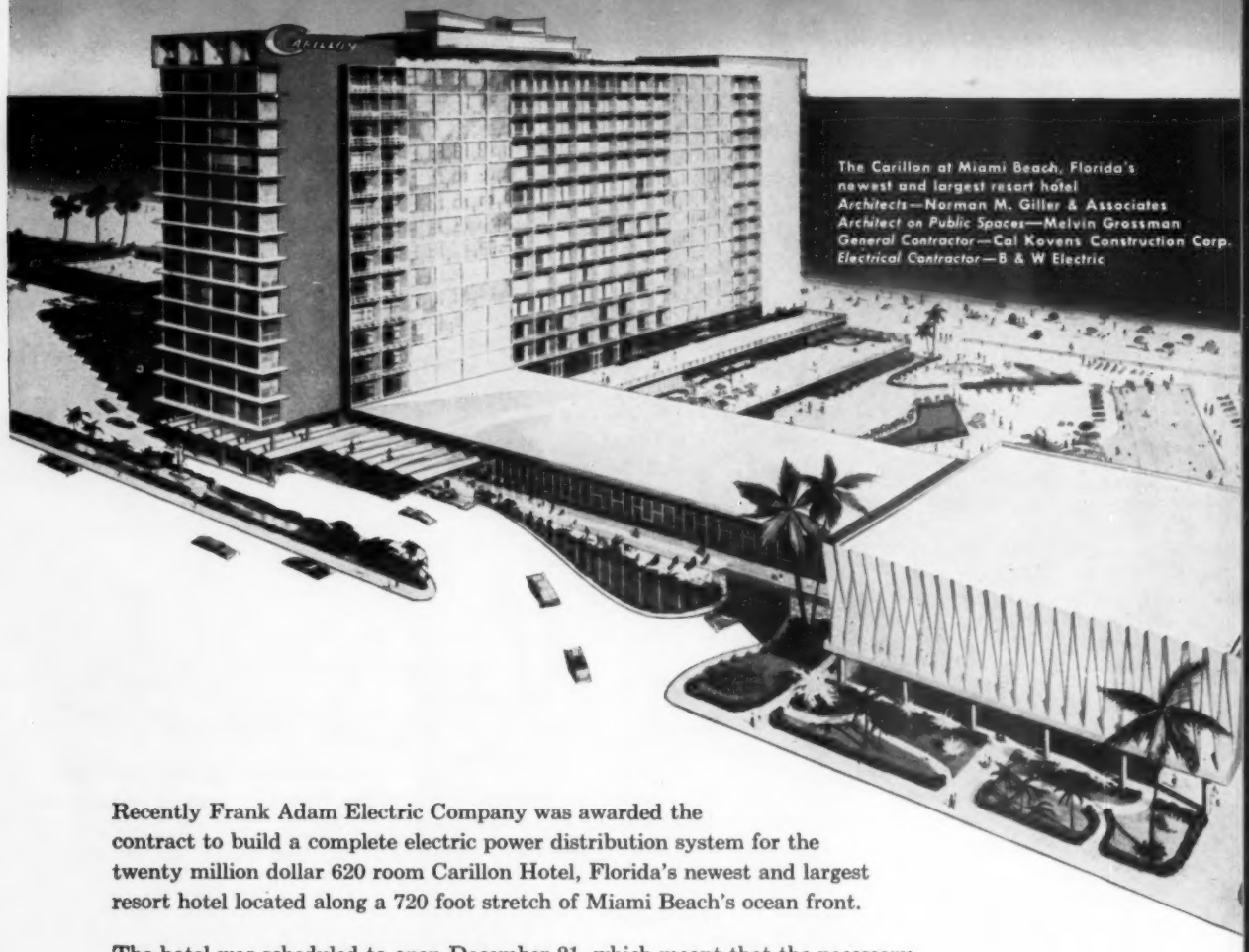

The Carillon at Miami Beach, Florida's newest and largest resort hotel
Architects—Norman M. Giller & Associates
Architect on Public Spaces—Melvin Grossman
General Contractor—Cal Kovens Construction Corp.
Electrical Contractor—B & W Electric

Recently Frank Adam Electric Company was awarded the contract to build a complete electric power distribution system for the twenty million dollar 620 room Carillon Hotel, Florida's newest and largest resort hotel located along a 720 foot stretch of Miami Beach's ocean front.

The hotel was scheduled to open December 21, which meant that the necessary equipment had to be designed and produced in record time.

Working closely with the electrical contractor Frank Adam built a distribution system that included two Ⓐ Klampswitchfuz switchboards, Klampswitchfuz power distribution panelboards, Powerplugin busduct and QP Quicklag P lighting panelboards to handle the hotel's heavy load concentration safely, efficiently and economically.

Recommendations of Frank Adam engineers were promptly accepted and the work of assembling the needed equipment was begun. Six days after the final "go ahead" order the last of the equipment was shipped and the hotel opened on schedule.

Designing and producing safe, dependable power distribution equipment for all types of buildings—residential, commercial, industrial and institutional—is a Frank Adam specialty. Include equipment bearing the trade-mark Ⓐ in your next job. Let your nearest Ⓐ Sales Engineer assist you in planning *your* next electrical distribution system. He is listed in Sweets.

for new $20,000,000 hotel in record time!

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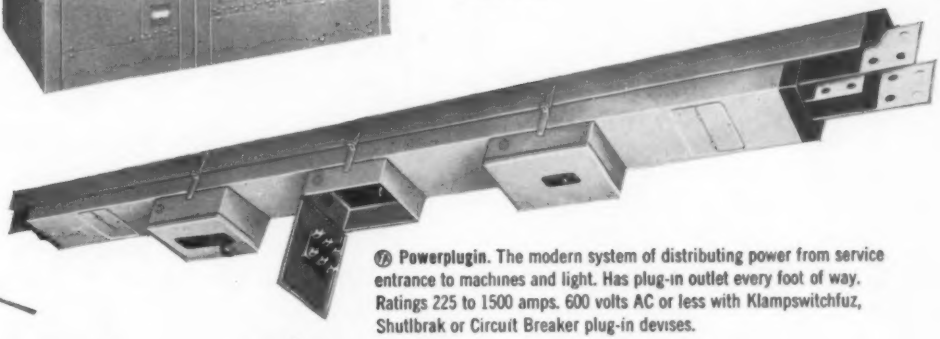
(FA) KLAMPSWITCHFUZ SWITCHBOARD
Features a hinged type, horsepower-rated operating switch that combines both disconnect switch and fuse protection into one unit. Ratings, 30 to 600 amperes, 250 volts AC or DC, 2 and 3 poles.



(FA) Powerplugin. The modern system of distributing power from service entrance to machines and light. Has plug-in outlet every foot of way. Ratings 225 to 1500 amps. 600 volts AC or less with Klampswitchfuz, Shutlbrak or Circuit Breaker plug-in devises.

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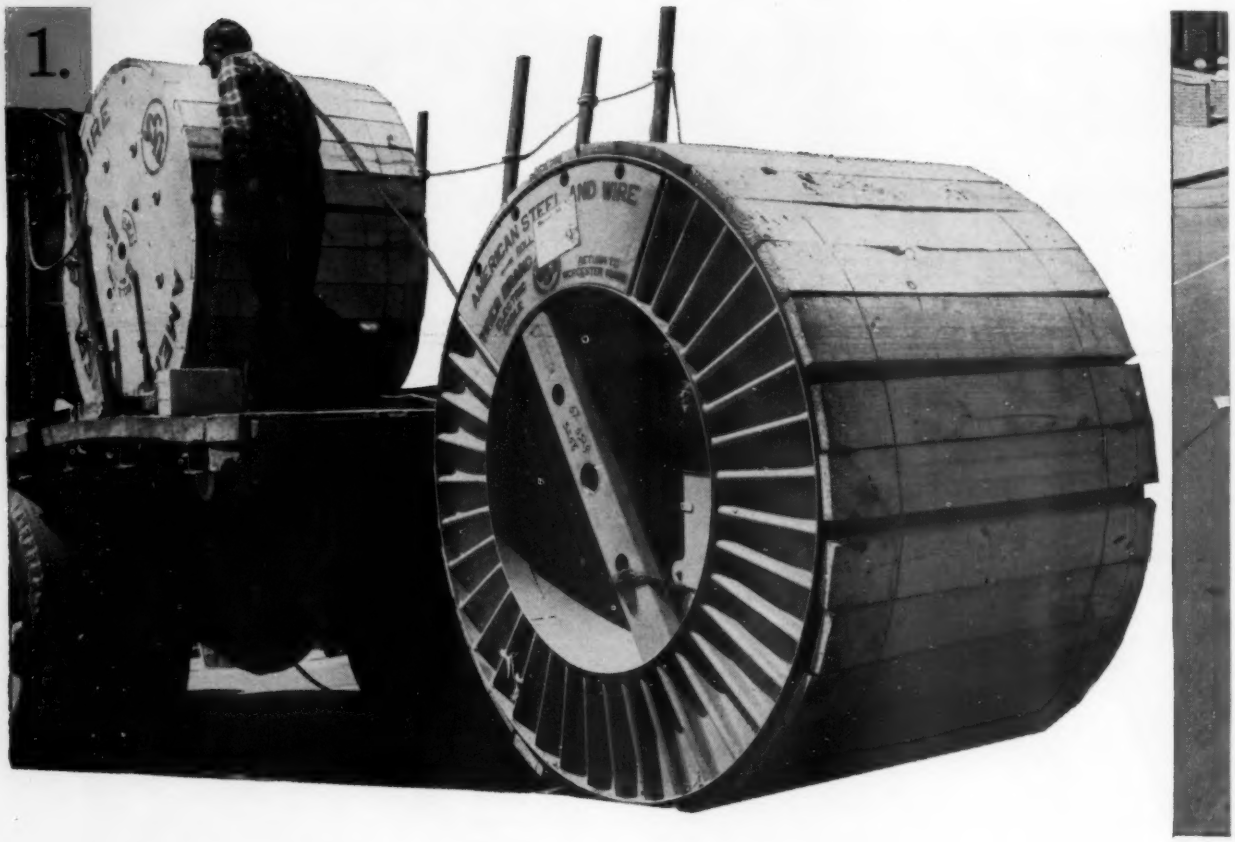

Con Edison increases capacity with Tiger Brand Paper-Lead Cable

LIKE most utilities, Consolidated Edison, New York City, is rapidly expanding in an endless race to keep up with growing demand for electrical power.

The problem of old and new comes into sharp focus in the Williamsburg section of Brooklyn. It's one of the earliest settled areas of the city. Many of the houses were not designed for any electricity—let alone for refrigerators, freezers, air conditioners, automatic heating systems and do-it-yourself power tools.

The installation of the Brooklyn-Queens Expressway—a new Belt road that sliced through the heart of Williamsburg, got in the way of existing electrical conduits and relocated some Con Edison customers. Now, the utility is re-routing with new lines to avoid the expressway.

The over-all job is a massive one, and the cable is supplied by several reputable manufacturers including American Steel & Wire. In the district shown in the photographs, AS&W shipped some 12,000 feet of 2/0, 27KV, 3-conductor, paper-insulated lead-sheathed Tiger Brand cable in carefully predetermined lengths.

For high voltage feeders, Tiger Brand Paper Insulated Cable is available in solid or gas pressure types. Many special constructions are available as standard production. An inquiry detailing your requirements will receive our prompt and careful attention.

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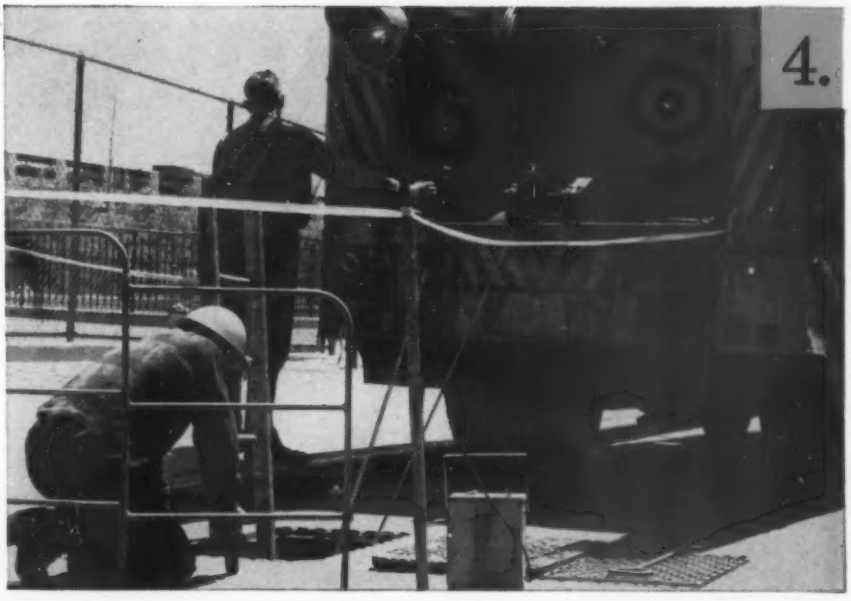
1. Reels are lowered onto street from winch truck, while workmen clean the 4-inch prefab concrete ducts.

2. Crew pulls the steel wire brushes through ducts to remove pebbles and dirt. Pull here is 393 feet.

3. Cable is heavily lubricated with special pulling compound before it goes into the baloney.

4. Winch truck begins pull, maintaining a 20-foot-per-minute rate.



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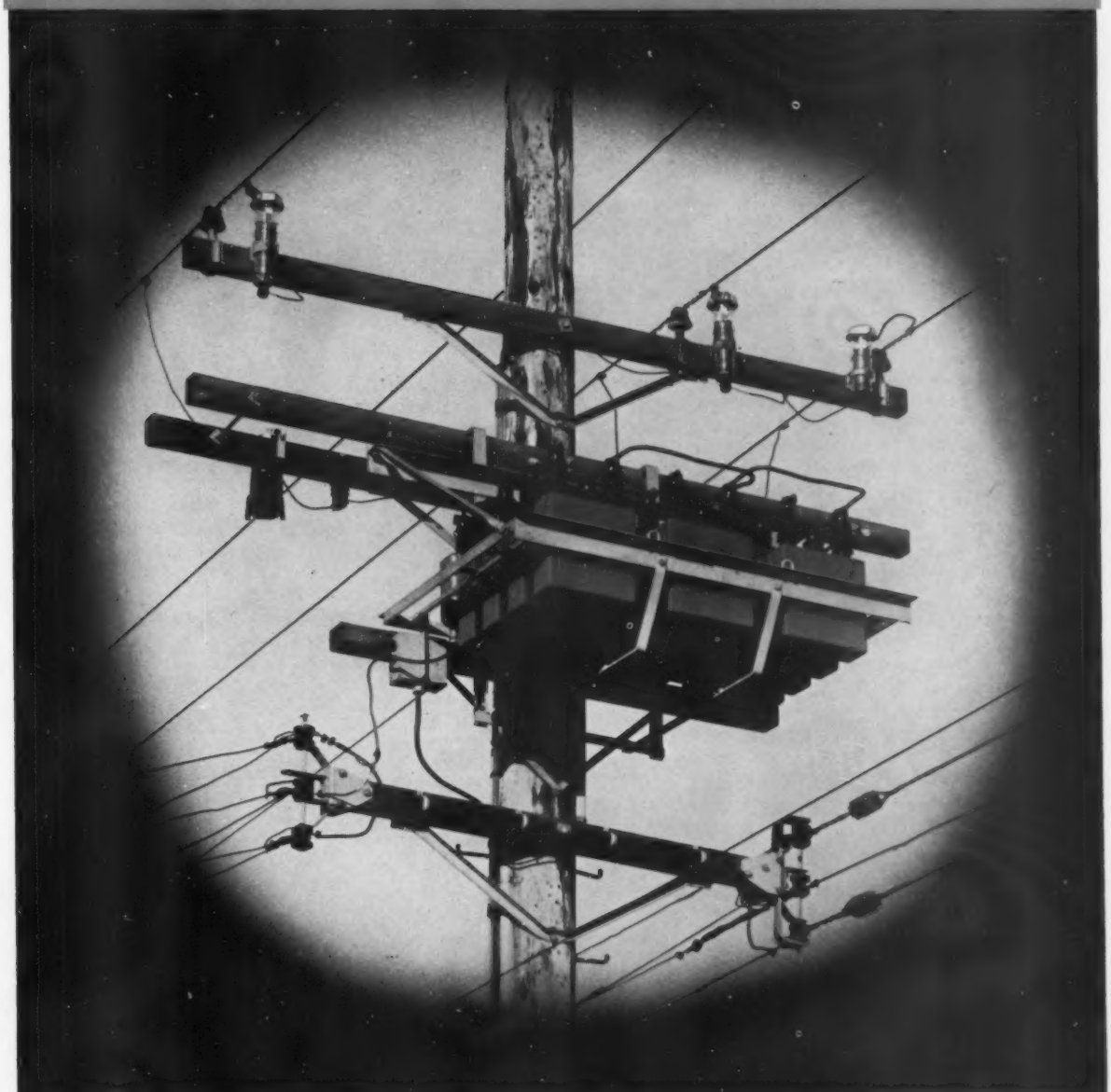

- **Differential schemes for transformer fault protection—Pg. 68**
- **Economics of residential secondary capacitor use—Pg. 74**

Transformer fault protection

Part 1

By J. L. Blackburn
Relay Department
Westinghouse Electric Corp.
Newark, N. J.

◆ FAULT PROTECTION for transformers of 1,000 kva and up is obtained principally by differential type relays. However, these relays cannot be as sensitive as the differential relays for generator protection because of the following factors not ordinarily present for generators:

1. Different voltage levels, including taps; hence, different primary currents in the connecting circuits.
2. Different current transformer types, ratios, and characteristics with possible mismatch of ratios for some cases and on some of the taps for units with ratio-changing taps. Also, current transformer performance will generally be different, particularly at high currents.
3. Magnetizing inrush current which appears to the differential relay as an internal fault.

The star-delta connections introduce a phase shift which must be taken into account in the application of differential relays to transformer banks. Phase-shifting and regulating-type transformers introduce additional problems requiring careful attention.

These factors are taken care of adequately by the combination of relay and current transformer design together with proper application and connections. The largest variable is the means of handling the magnetizing inrush and thus this problem will be considered in some detail first.

Magnetizing inrush

When a transformer is first energized, a transient magnetizing or exciting current may flow which appears as an internal fault to the differentially - connected relays. Peak inrush currents of 8 to 10 times full load peaks are not uncommon. The factors controlling the magnitude and duration of the magnetizing inrush are:

1. Size of the transformer bank
2. Size of the power system
3. Resistance in the system from the source to the bank
4. Type of iron used in the transformer
5. Prior history of the bank (residual flux)
6. How the bank is energized (initial, recovery, or sympathetic inrush)

The maximum inrush current occurs if the transformer is energized when the voltage wave is near zero. At this time, the current and flux should be a maximum in the highly inductive circuit, and a half wave of voltage requires a flux change of twice the maximum flux. If there is a residual flux left in the bank from the previous energization, it may either add or subtract from the total flux, thereby increasing or decreasing the inrush current. Power transformers are operated normally near the knee of the saturation curve, so the additional flux requirement of zero - voltage - wave energization plus any residual flux will definitely saturate the iron and increase the magnetizing current components. A typical inrush current wave is shown in Fig. 1.

The inrush current decays rapidly for the first few cycles, and then very slowly, sometimes taking 4 or 5 seconds to subside, where the resistance is low. The time constant of the circuit (L/R) is not a constant because L is variable because of the transformer saturation. During the first few cycles, the saturation is high; hence, L is low. As the losses damp the circuit, the saturation becomes less and L increases. According to a 1949 AIEE report, time constants for inrush vary from 10 cycles for small units to 1 minute for large units.

The resistance from the source to the bank determines the damping of the current wave. Hence, banks adjacent to or near a generator will have a long inrush. On the large Boulder Dam transformers located adjacent to the generators, the inrush current was still approximately two amperes secondary (5 ampere CT) after 5 seconds. The normal exciting current was 0.25 ampere secondary. At substations remote from the generators, the inrush is not nearly so severe, as the resistance in the connecting line quickly damps the current.

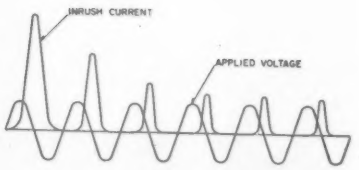

Fig. 1—Typical magnetizing inrush current wave.

Fig. 2—Typical magnetizing inrush current wave that can exist in one of the phases to a delta connection or in the secondary of delta connected current transformers.

The wave shape of the inrush current into a delta winding is influenced by two conditions, in addition to those involved in single-phase inrush. First of all, more than one core may experience an inrush. Since the inrush current peaks in each of the cores experiencing inrush will be out-of-phase by 60°, or a multiple thereof, the normal sinusoidal shape of a single phase inrush will be distorted, or the net wave will be oscillatory as shown in Fig. 2.

The second factor that affects the shape of a polyphase or a single-phase inrush into a delta winding is that the line current is the vector sum of two currents from the bank windings. Depending on the nature

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This material is abstracted from "Applied Protective Relaying," published by Westinghouse Electric Corp. Copies of the book are available at $3.00 from the Technical Information Dept., Westinghouse Electric Corp., Box 2278, Pittsburgh 30, Pa.

of the inrush, assuming only one core has saturated, the oscillatory waves or the distortion of the single-phase shape can also be experienced.

If by chance there is an additional delta winding on this bank, the inrush is influenced by the coupling between the different voltage windings. If the unit is a three-phase transformer, depending on the core construction, interphase coupling is present and may effect the inrush currents.

Similar wave shapes are also encountered when energizing the wye winding of a wye-delta bank or when energizing an autotransformer. In this case the single phase shape is distorted because of the interphase coupling provided by the delta winding (or tertiary).

A maximum inrush will not occur on every energization because the probability is low for energizing at zero voltage. Energizing at maximum voltage will not produce an inrush with no residual. In a three-phase bank, the inrush will vary appreciably in the three phases.

The largest inrush occurs when an unenergized bank is connected to the system. However, an inrush can occur after a fault is cleared external to the bank when the voltage returns to normal. In this case, the transformer is partially energized so the recovery inrush is less than the initial inrush.

When a bank is paralleled with a second energized bank, the energized bank can have a sympathetic inrush. The offset inrush current of the bank switched on the line will find a parallel path in the energized bank, and the d-c component may saturate its iron, causing an apparent inrush. Again, this inrush is less than that of the initial inrush, and its magnitude depends upon the relative value of the transformer impedance to that of the rest of the system which forms an additional parallel circuit.

On unit-type generator and transformer combinations, there is no initial inrush problem, as the unit is brought up gradually to full voltage. Here the recovery and sympathetic inrushes may be a problem, but as indicated above, they are less severe.

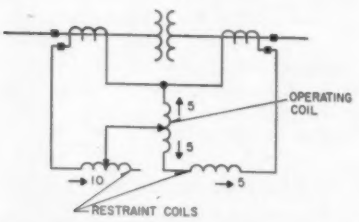


Fig. 3—Distribution of currents in the Type CA relay set on 5-10 taps.

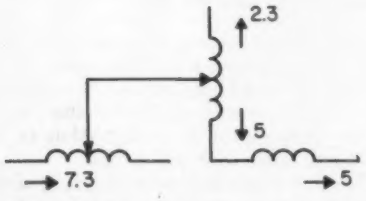


Fig. 4—Distribution of currents in the Type CA relay set on 5-7.3 taps.

Eliminating inrush error

Since the inrush current appears as an internal fault to differential relays, some means of desensitizing them during an inrush is necessary. Several methods exist and all are in general use. They are:

1. A differential relay with reduced sensitivity to the inrush wave (a higher pick-up to the offset wave, plus time delay to override the high initial peaks).

2. A voltage-operated automatic tripping suppressor unit in conjunction with the differential relay.

3. Harmonic desensitizing unit in conjunction with the differential relay.

4. Desensitizing the differential relay during bank energization.

The type CA transformer differential relay is a good example of method 1. This application is the least complex, most economical, and there are hundreds in successful service.

This relay for two-winding banks is similar to the type CA generator relay, except that it has 50% percentage unbalance characteristic, a minimum trip current of 2.8 amperes, and taps for a 2/1 difference in the ratios of the main current transformer, as illustrated in Fig. 3. The taps are 5-5, 5-5.5, 5-6, 5-6.6, 5-7:3, 5-8, 5-9, 5-10. When the ratios are such that the relay would balance on a through fault with 5 and 10 amperes, the 5-10 tap is used and the current distribution is as shown in Fig. 3. For the 7.3-5 tap case, the distribution is shown in Fig. 4. In all cases, the net ampere-turns cancel in the operating winding so that no operating torque is produced.

For three-winding transformer banks, the type CA-4 relay is applied. This relay has four induction disc units operating on two discs. Three of the units are used for restraint in each of the three bank windings and one is used for the operating unit connected in the difference circuit.

Taps are available for 15-25-40% percentage characteristics with a minimum pick-up of 4.0, 2.5, or 1.3 amperes, 60 cycles, respectively, depending on the percentage tap. The time of operation is 2 to 6 cycles.

The type CA-6 has been used for transformer protection, although it was intended for bus protection. Recognizing this, the CA-5 relay was brought out, which is one restraint and the operating element of the CA-6. These relays have a variable percentage characteristic, a low percentage on light faults where the current transformer performance is good and a high percentage on heavy faults where current transformer saturation may be a problem. The two restraint windings are on the same element so that they add to increase restraint on all external faults and subtract to cancel restraint on all internal faults. Thus, the effect of load on pick-up is minimized, and faster operating times with lower minimum pick-up values are possible. The minimum pick-up is adjustable between 0.75-2.0 amperes with an operating time of 2 to 6 cycles.

The variable characteristics are obtained through a saturating transformer in the operating circuit which also tends to shunt the d-c component away from the operating coil.

The magnetizing inrush current contains a predominance of even harmonics, particularly the second. The induction-type relay, such as the CA relay, is less sensitive to this type of wave. This characteristic, together with an operating time of 5-6 cycles, means that the type CA relay will not operate on inrush currents except in extreme cases of a large transformer adjacent to a large generating source. This relay is more than twice as insensitive if the relay is connected such that it receives the inrush current on the tapped winding.

Another suppressing method

The voltage-operated unit, method 2, is known as the type TSI magnetizing inrush tripping suppressor. It is most often applied with the type CA-4 relay for three-winding banks but may be used with the CA. Three-phase voltage

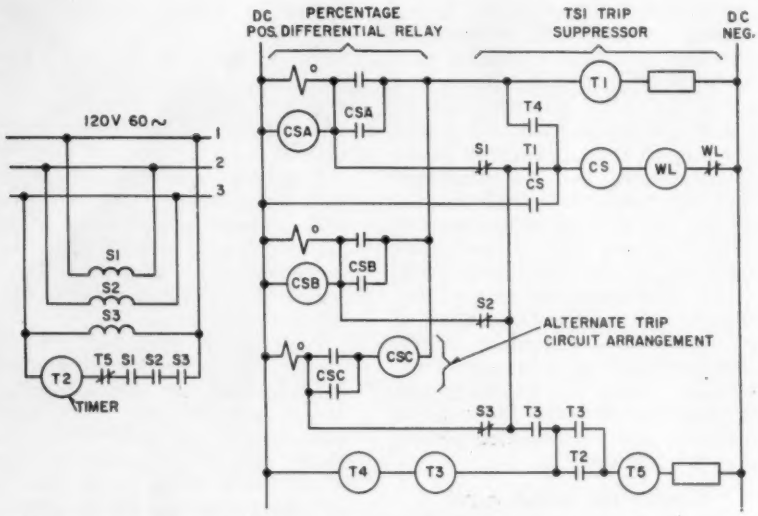


Fig. 5—Schematic diagrams for the TSI voltage operated trip suppressor.

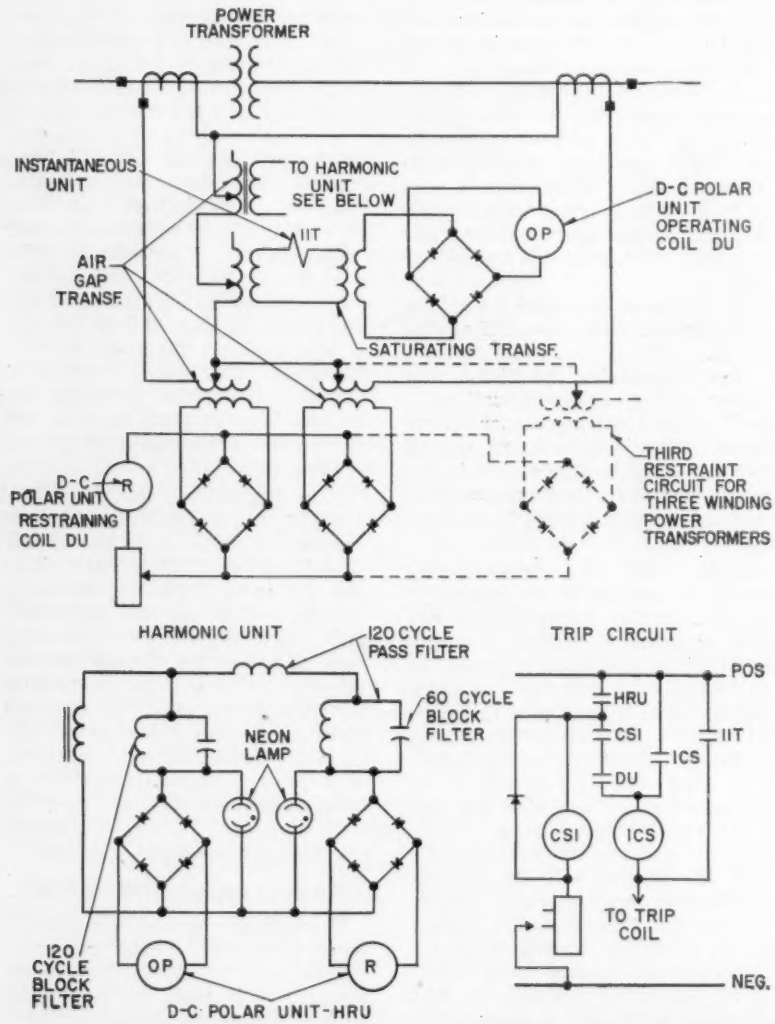


Fig. 6—Schematic connections of the HU and HU-1 variable percentage differential relays with second harmonic restraint supervision.

is used as the criteria between a fault or an inrush. A fault is distinguished by a reduction in one or more of the phase voltages, while the inrush occurs at full voltages. This method does not directly desensitize the relay itself, and any internal fault that reduces one or more of the voltages to drop out the voltage unit, will permit immediate tripping if the differential relay contacts are closed. The scheme is shown in Fig. 5.

On an inrush, the voltage units all open before the differential units can operate and energize T-1. If any of the voltage units (S-1, S-2, or S-3) do not open indicating a fault, tripping is immediate through the back S-1, S-2, or S-3 contacts and T-1. A timer, T-2, adjustable up to 5 seconds, restores the normal trip path through the differential relay contacts by closing the T-4 contact. T-3 and T-5 are auxiliary units to seal in the T-4 unit and deenergize the timer, respectively.

The voltage units must be energized with, or at the same time as, the bank. This requires a three-phase potential source in the differential zone or the use of "a" switches on the breaker between the transformer and the potential transformer on the energizing side. When the suppressor is connected to the delta side of the bank, line-to-line voltages are used. When connected to the star side, 120-volt line-to-neutral voltages are preferred, although line-to-line voltages are commonly used.

The voltage elements are set to pick-up at 100 volts and will drop out at from 90 to 95 volts. Thus, the differential relay is desensitized indirectly only to the extent that the internal fault must drop the voltage from normal of 120 or 115 to 90-95 volts.

Using harmonic content

The third method is to use the harmonic content of the inrush current to restrain, and thus desensitize the relay. This method has merit but is not without problems. It is necessary to provide sufficient restraint for the inrushes, yet provide some degree of sensitivity for internal faults which also may contain a large amount of harmonics because of the nature of the fault or because of a combination of a light fault with an inrush.

The types HU two winding and HU-1 three winding variable percentage differential relays with second harmonic restraint super-

vision adequately solves these problems. The schematic connections are shown in Fig. 6. The differential unit consists of air-gap transformers, which feed the restraint circuits and a non air-gap transformer to energize the operating coil circuit. The rectified restraint outputs are connected in parallel so that the relay restraint is proportioned to the maximum restraining current flowing in any restraint circuit.

Setting percentage taps

The variable percentage characteristic provides a low percentage (around 15%) on light faults where the current transformer performance is good and a high percentage (around 50-60%) on heavy faults where current transformer saturation may be a problem. This is obtained by the saturating transformer in the operating coil circuit. Taps are provided for balancing out unequal current transformer ratios. These are 2.9- 3.2- 3.5- 3.8- 4.2- 4.6- 5.0- 8.7 with the minimum pick-up current of 30% of the tap value. This is the current to just close the differential unit (DU) contacts with the operating and one restraint coils energized. The restraint coils will carry 10 amperes continuously on any tap.

The harmonic unit contains a 120 cycle (2nd harmonic) blocking filter in the operating coil circuit and a 120 cycle pass-60 cycle block filter in the restraining coil circuit. When an inrush occurs with its second harmonic predominant characteristic, ample restraint with minimum operating energy exist in the unit. The circuit is designed to hold its contacts open when the second harmonic component magnitude is approximately 15% of the fundamental. Studies indicate that this restraint is adequate to handle inrushes that can be practically encountered. The minimum second harmonic content found in analysis of a large number of actual inrush currents was 23% of fundamental.

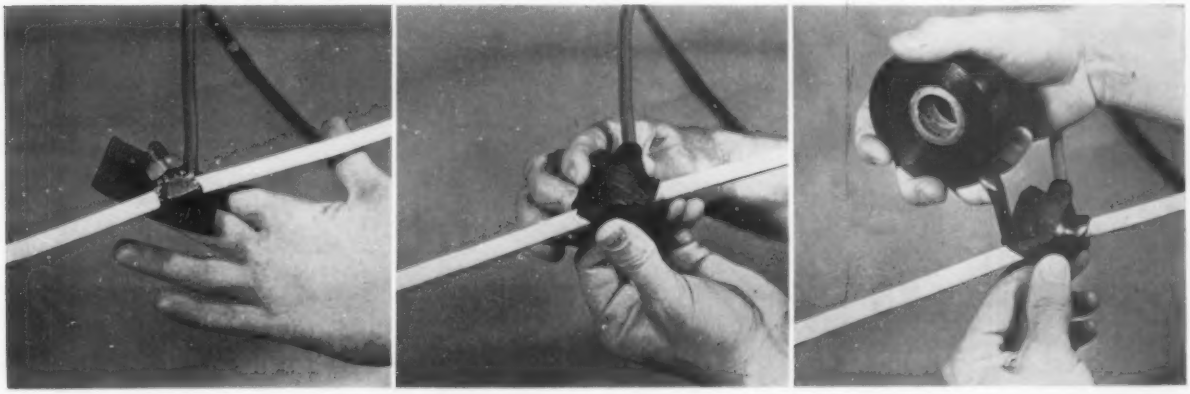
Internal fault operation

For internal faults, ample operating energy exists from the 60 cycle fundamental and all harmonics except the second which is in low predominance during a fault. In addition, minimum restraint energy is produced by the fundamental. Thus, in the absence of second harmonic, this unit (HRU) will operate at the same pick-up as the differential unit permitting the differential unit (DU) to operate sensitively on internal faults as shown in the trip circuit of Fig. 6. On external faults the differential unit (DU) will restrain. On magnetizing inrush, the harmonic unit (HRU) will restrain and the differential unit (DU) may or may not operate depending on the severity of the inrush. The operating time of the relay is 1.5 to 2.5 cycles.

An instantaneous unit (IIT) is provided in the operating circuit to provide one cycle operation for very heavy internal faults. Its pick-up is 10 times the relay tap value. This provides a setting to override the inrush peaks and maximum false differential current on external faults.

The final method 4 is desensitizing of the differential relay such as the types CA, CA-4, CA-5 during the time when the transformer is being energized. This is done by switching a resistor in parallel with the operating coil to temporarily raise the relay pick-up by about two to three times. The resistors can be switched manually as the bank breaker is closed, or automatically by time-delay dropout overvoltage relays. The latter method will take care of the recovery inrush in the few cases where that is a problem.

(This discussion of transformer fault protection will be continued by Mr. Blackburn in the May issue of Electrical South.)



New method saves time and tape on electrical connector splices

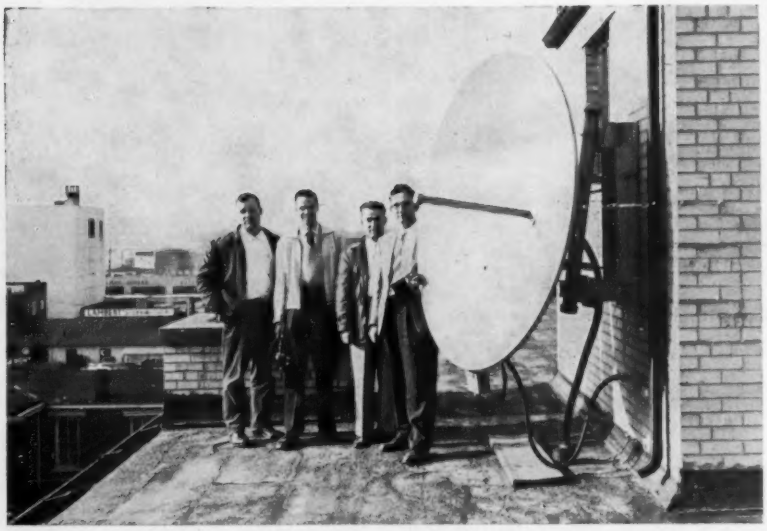
◆ A NEWLY DEVISED method of padding the sharp corners on electrical connectors saves both time and tape for electricians making the splice. By forming a cross with two pieces of insulating putty, the connector is enclosed in a padding of the putty and ready for wrapping.

About 15 per cent of the average time required for insulating splices is saved along with about 50 per cent of the tape normally used. In addition, the method provides a standard which helps in eliminating variables in splice quality.

The photo at left shows a 1-inch connector on which a 2-inch piece of Scotchfil is placed behind the connector. A second 2-inch piece is placed over the connector at right angles to the first piece. The ends of the two pieces are squeezed down so they each overlap the center of the other piece. The padded splice is then wrapped with tape. (Photos Minn. Mining & Mfg. Co.)

Microwave communication

Similar to the other four relay stations in Appalachian Electric Power Company's new microwave system is this one at Coal Fork. Construction and equipment are the same, with one exception. This station has three antennae, one is for Charleston, one for Turner and the other for Lick Knobb, the next relay station in line.



Four of the many employees instrumental in installation of the new microwave system are shown beside the Charleston office equipment. From left to right, they are Jack McCallister, system station helper; Jim Duffield and C. F. Casto, Charleston Division radio engineers; and R. L. Hall, system electronics engineer.

◆ A 145-mile microwave system connecting Appalachian Electric Power Company offices in Roanoke and Charleston is now in operation. Microwave is a point-to-point system of radio communication using no wires.

The eight-station system, providing ten voice channels, strengthens the company's communications, making for better service to customers.

In addition to the two main terminals atop the Roanoke and Charleston office buildings in the present system, another terminal point has been established at Turner substation near Charleston. Five repeater stations, which receive signals and relay them on, are located atop mountains between the two cities.

Work will also begin soon on an extension of the system from Turner to Philip Sporn plant at Graham Station, W. Va., a distance of 51 miles. The terminal at Sporn plant will tie Appalachian's microwave system in with that of Ohio Power Company and Indiana & Michigan Electric Company, affiliates with Appalachian in the American Gas and Electric Company System. Two repeater stations, near Milton, W. Va., and Cottageville, W. Va., will be part of the extension, to be in operation by July 1958.

The microwave system is operated by the system T&D department in Roanoke. George M. Guill, system electronics engineer, in charge of microwave operations, in explaining this new microwave link, broke down the ten voice channels this way:

Three of them are from the Roanoke PBX switchboard to the Charleston PBX switchboard. This communications link will be extended to the company's offices at Point Pleasant, Huntington, Logan and Williamson, by leased telephone circuits. Three more channels will run from the system coordinating office in Roanoke to Charleston, and then on to the AGE Central Dispatching office in Columbus, Ohio, by leased circuits.

Three channels will run to Turner substation, and the final

channel will be used for service, connecting all terminals and repeater stations for maintenance. All are voice channels, although two will be used for teletype and telemetering.

Mr. Guill explained that microwave, a point-to-point system of radio communication, differs from a radio broadcast system which sends beams out in all directions. The microwave signal is concentrated much like a searchlight beam.

Instead of permitting the antenna to scatter waves in all directions, the parabolic reflectors which are mounted on top of the repeater stations concentrate the energy in the desired direction. Signals from opposite directions can be simultaneously received, amplified and re-transmitted at the five repeater stations.

Because it is focused so narrowly, a microwave transmitter needs only a little more power than a flashlight. Good illustrations of microwave in action, according to Mr. Guill, are television and many telephone conversations. Television beams are transmitted by microwave, and many telephone com-

(Continued on page 138)

Making the first call on Appalachian Electric Power Company's new microwave system is G. L. Furr, vice-president and general manager. Looking on are, from left to right: George M. Guill, system electronics engineer, who is in charge of the microwave operations; J. P. Cruickshank, general superintendent of the system transmission and distribution department which operates the system; and H. A. Clarke, superintendent of the system station department.

E. K. Chambers, electronics engineer, left, and R. R. Hawkins, station helper, right, check equipment in a relay station. The two pictures show almost all equipment installed in a relay station.

Economics of secondary capacitors

By John A. Sainz
and Norman M. Neagle

Capacitor Department
General Electric Co.
Hudson Falls, N. Y.

◆ RESIDENTIAL secondary capacitors are designed for installation on 240 volt secondary systems close to residential loads. Because these capacitors release valuable distribution transformer and feeder capacity, a system can serve more customers, or an increased load can be handled for existing customers.

Capacitor prices vary principally according to the size of units and voltage rating. At the present time, the capacitor with the lowest price per kvar is the 50-kvar unit with a voltage rating of 2400 or 4160 volts. This, of course, means that the primary capacitor is the lowest cost method for generating kilovars in the distribution system.

However, the closer a capacitor is placed to a load requiring kilovars, the more system benefits are realized. Both a secondary capacitor kilovar and a primary capacity kilovar provide the same benefits from the location of the primary back to the generator. A comparison between the value of additional system benefits and the additional cost of secondary capacitors over primary capacitors determines the economics of using secondary capacitors.

The installed cost of 2400/4160-volt primary capacitors in small quantities, such as 150 kvar, may run up to $7 per kvar. The installed cost of secondary capacitors is estimated to be $16 per kvar. Therefore, the difference in the installed cost of the secondary versus the primary capacitor is about $9 per kvar. For the secondary capacitor to be an economical investment, the dollar value of additional benefits derived from using these capacitors should be at least $9 per kvar.

The additional benefits of locating capacitors on the secondary can be evaluated as follows:

Voltage improvement

Figure 1 shows the percent voltage rise through several typical sizes of distribution transformers as a result of installing various sizes of secondary capacitors. For example, the voltage improvement resulting from the installation of two 5-kvar capacitors on a secondary circuit supplied from a 15 kva transformer is 2 × .365 or .73%. Figure 2 gives the voltage rise on a secondary circuit as related to the distance from the transformer to the capacitor location. The curves show the range of voltage rise obtained for typical secondary wire sizes. In the above example, the 5-kvar capacitor, located 600 feet from the transformer, causes a 1.25 percent voltage rise. The total voltage improvement in the transformer and secondary circuit is 0.73 + 1.25 or 1.98%.

Loss reduction

Figure 3 demonstrates the loss reduction benefits of secondary capacitors for a 25-kva transformer having two 5-kvar capacitors installed on the secondary. At 120% loading and 80% power factor, the peak load loss reduction is 150 watts.

Besides the loss reduction in the distribution transformer, a loss reduction will be made on the 240 volt secondary circuits between the distribution transformer and capacitor locations. Normally this reduction will be about double the savings made in the distribution transformer, so a total loss reduction in the distribution transformer (150 watts) and secondary (300 watts) will total about 450 watts for 10 kvar of capacitors. This means the saving per kvar will be around 45 watts. Evaluated at $200 per kilowatt, these losses are worth $9.00 per ckva, or enough to justify the added cost of residential secondary capacitors.

Other benefits

Secondary capacitors release distribution transformer thermal capacity. The extent of this reduction will depend on the load, its power factor, and the size of the secondary capacitor.

These capacitors, therefore, offer an easy, inexpensive means of relieving overloaded transformers

(Continued on page 76)

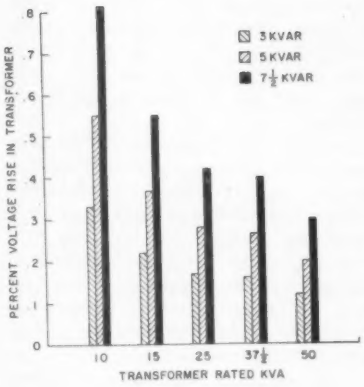


Fig. 1 — Typical voltage rise through distribution transformer.

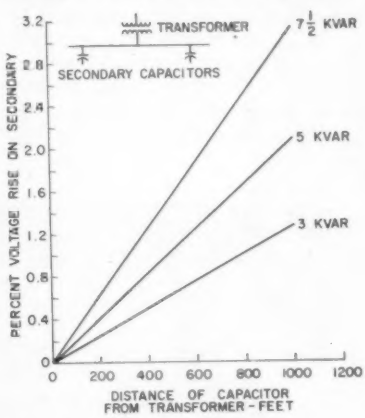


Fig. 2—Typical voltage rise on secondary circuits.

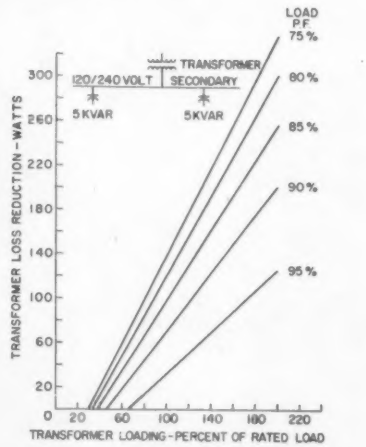
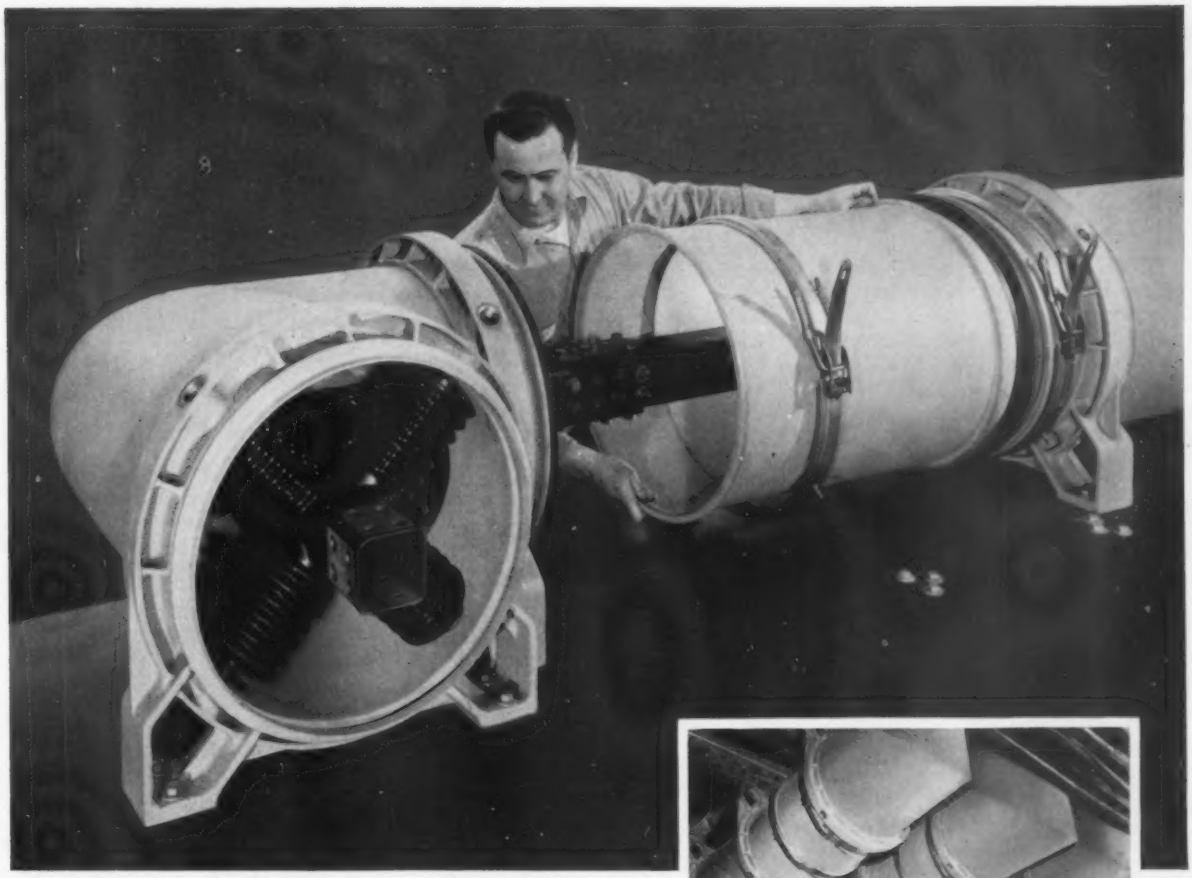


Fig. 3—Typical loss reduction in 25 kva transformers by two 5 kvar secondary capacitors.



Custom-built for specific requirements! Heat-treated cast aluminum alloy rings — welded to stationary tubular sections — replace ring gaskets. Porcelain insulators are in compression under normal loads and short circuits. Circular gaskets are fully trapped and self-seating.

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Steel mesh jacket protects line poles from woodpeckers

◆ BUILDING electric power lines in remote sections of the country is not easy—especially in southern swamps, where underbrush and trees have to be cleared before holes can be dug for poles and conductors strung.

But to return to the swamps later to replace a structure, whose top part (with the cross arms) has broken off and been left hanging from the conductors, is something construction men and utility maintenance people dislike.

In the Atchafalaya swamp region of Louisiana, things had gotten so bad that engineers of Stone & Webster Engineering Corporation and Gulf States Utilities Company, decided to put jackets of steel mesh around the upper half of each pole.

The woodpeckers, said to be the size of chickens (and even as big as turkeys, according to some of the natives) until recently have been winning in this struggle between man and nature.

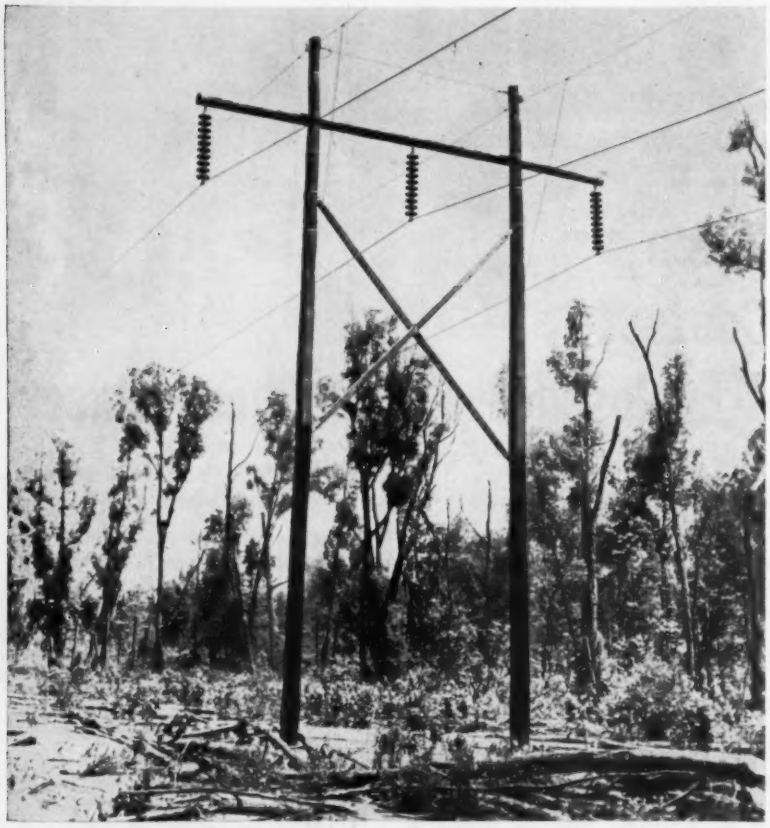
New poles seem to have an especially appealing taste to these Louisiana woodpeckers and even when treated with creosote and other chemicals, were targets for the pecking birds. In fact, engineers said, apparently the birds seemed to like the taste of the chemicals.

Typical Piliated Woodpecker and an example of pole damage which has led to use of steel mesh jacket.

Chipping out holes for their nests, gives the birds fine homes, but the cost of replacing poles can sometimes be excessive. In some cases, Stone & Webster engineers who have designed and built power transmission lines in many parts of the country, have had to replace new poles, before they even got the line installed.

Another oddity of this battle of man against nature, is that the engineers found that the galvanized hardware cloth jacket did not have to go below 20 feet from the ground. For some reason of their own, the Louisiana woodpeckers do not peck away at anything below that height.

The jacket for the poles are made of one-quarter inch steel mesh, 19-gauge galvanized hardware cloth.



Here is a view of a Louisiana swamp where upper half of poles of a power transmission line have been covered with a jacket of steel mesh to thwart the over-sized woodpeckkers in the Atchafalaya region.

Secondary capacitors

(Continued from page 74)

serving low power factor loads. Transformer changeout, or the installing of additional transformer capacity, can be delayed until a more convenient time.

Secondary capacitors are easy to install. After the ratio between distribution transformer kva and secondary capacitor kvar is determined for a given system, line crews can install secondary capacitors along with each distribution transformer. Following this procedure, capacitors are automatically installed at the load, and remain associated with it during any routine or emergency changes in the primary system.

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Copier is key drafting-room tool

◆ A STANDARD OFFICE copying unit, said to cut drafting-time on detailed electrical assembly drawings up to four hours each, has become a key drafting-room tool for B. L. Vannort Engineers, Inc., of Charlotte, N. C.

This firm—predominantly active in the field of electrical engineering as applied to rural and municipal systems, REA-financed cooperatives, and transmission and telephone systems—has designed, prepared plans and specifications, awarded contracts, and supervised actual construction for REA projects in 11 states east of the Mississippi.

By adapting the Verifax Copier to its drafting department needs, the firm has been able to make more efficient use of its draftsmen's and engineers' time, increasing over-all work efficiency and, at the same time, gain in drawing accuracy through photographic reproduction techniques.

Drafting time halved

Payoff for Vannort is in the blue-chip savings involved when highly-skilled personnel is relieved of up to 50% of the former routine re-drafting chores. The adoption of modern office copying techniques in the drafting room means that it is no longer necessary for draftsman and engineers to re-draw entire sketches when only a few corrections or changes are called for.

In order to provide a complete planning and design service, Vannort maintains a mechanical, structural, and architectural section, each section under the direction of a registered engineer and architect with a comprehensive engineering background. In toto, the firm has a staff of 70 employees to carry out its various engineering and architectural activities.

With a heavy work load the general rule at Vannort, time-saving adds materially to over-all efficiency. In the preparation of detailed distribution assembly drawings, for example, the firm has been able to cut drawing-time in half through the use of the office copying unit—at the same time automatically assuring itself of photo-exact accuracy which is so essential in their operation.

Facilitates corrections

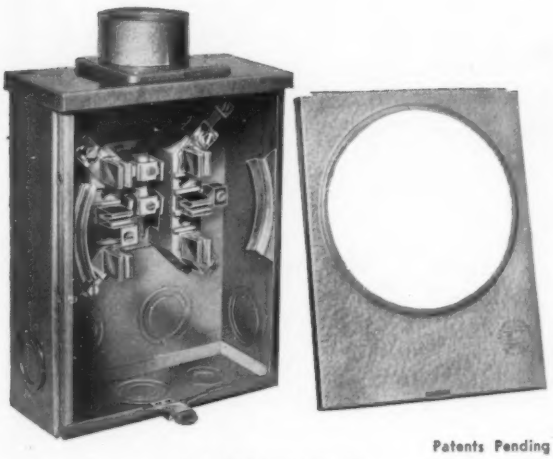
Vannort makes translucent copies of previously-adopted standard detailed engineering drawings and wiring diagrams requiring revision or modification on the copying unit. The translucent copies serve as masters for use on its diazo printer or to make additional copies on the copier. In making copies, certain details which should be changed, such as description, dimension, or entire elevations or diagrams are blocked-out with white paper. And new data can be added to the translucent copy before additional copies are made.

Previously, it was necessary first to photograph the original drawing, send it out for processing (negative and positive), so that there would be a file record of the original, and then have a draftsman build-up on the original.

Using the copying unit, however, the process is speeded-up, with the original drawing serving as basis for a new drawing. If one or more diagrams on the drawing need be changed, the draftsmen can "scissor" them from the sheet and replace them with the specific revisions. The replacement diagram

(Continued on page 137)

With new copying unit, Vannort draftsmen no longer re-draw entire sketches to make minor corrections. Photos at right depict drafting reproduction procedures. (1) Draftsman cuts out area to be changed on original diagram, drawing correction on piece of white paper for pasting to original sheet. (2) Original is now ready for reproduction (note correction pasted on sheet). (3) Sheet is placed in copier, the size of a standard typewriter and requiring no special skill to operate. (4) Operation, requiring about two minutes, yields photographic copy on translucent paper, enabling build-up of drawings from the original. (Photos: Eastman Kodak)



Patents Pending

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175 Ampere Capacity
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Added Line Terminals for connection to other sockets

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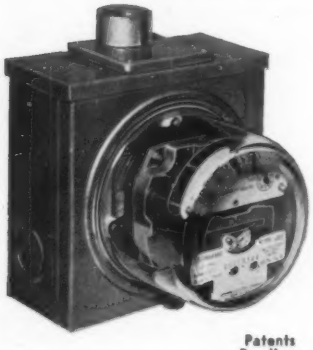

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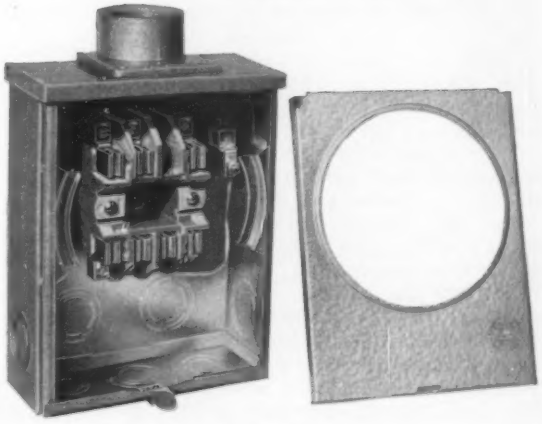

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New transformer insulation permits greater overloads

◆ INSULDUR—the new insulation system developed and recently announced by scientists at Westinghouse Electric Corporation—will be used in all future distribution transformers (both conventional and protected type) manufactured by the company. The announcement was made by Gordon C. Hurlbert, manager of the Westinghouse distribution and instrument transformer department, Sharon, Pa.

At the same time, Mr. Hurlbert announced higher breaker trip settings for Insuldur-equipped CSP distribution transformers. The new settings will boost normal overload capacity of the transformers by about 25 per cent over 1954 settings. An additional 15 per cent is available on an emergency overload basis.

"Development of this new Insuldur insulation system makes it possible to increase by a significant amount the breaker settings of our CSP transformers without any sacrifice in service life."

"Raising the breaker trip settings on the CSP transformers," Mr. Hurlbert said, "results in a boost of about 25 per cent in overload capacity over 1954 settings. That is, a 25-kva unit with 1954 settings would trip off the line in 90 minutes when carrying about 47 kva. An Insuldur-equipped 25-kva transformer set for the higher trip levels will carry about 60-kva for 90 minutes. These figures are based on a preloading condition of 75 per cent load and an ambient temperature of 35 degrees C."

Stabilizer added to paper

The new insulation system, first announced in January, consists basically of adding an organic stabilizing compound to the paper insulation. In addition, the system incorporates a new high-temperature wire enamel that is compatible with the additive.

"The limiting factor on transformer life, particularly at higher than normal temperatures, has been deterioration of the insulating paper," said Mr. Hurlbert. "Over long periods, it tends to lose strength and become brittle. The new Insuldur greatly reduces this deterioration of the paper, particularly in the range of peak loads that occur in distribution pole-type transformers. This effect," he said, "is obtained by chemical interaction of the stabilizer with the cellulose fibers which makes the paper stronger and longer lasting.

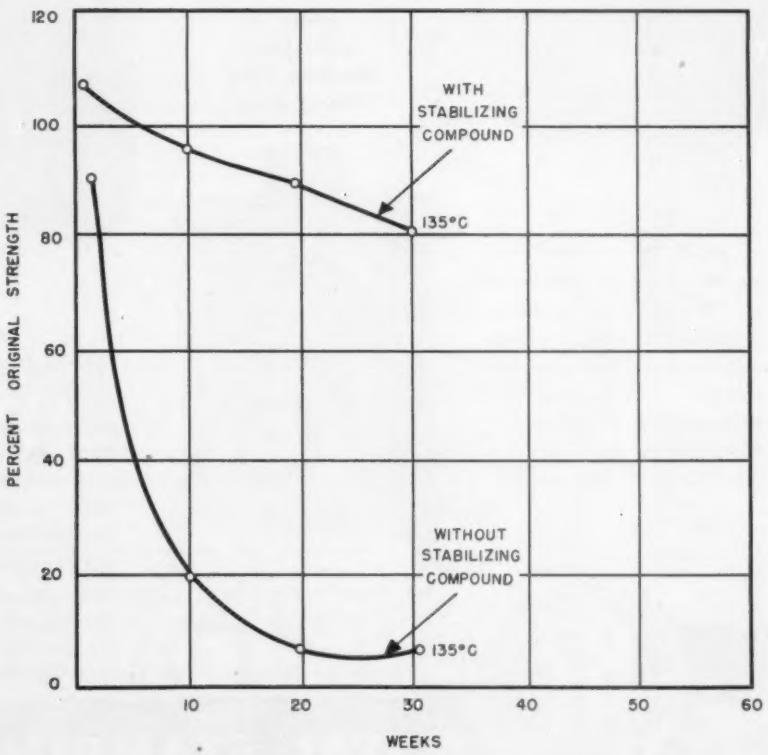
"By combining these effects, paper insulation in distribution transformers, which has long been the weak link in the oil-enamel-paper insulation structure, has been brought into line with the temperature capabilities of the oil and enamel."

Less transformer investment

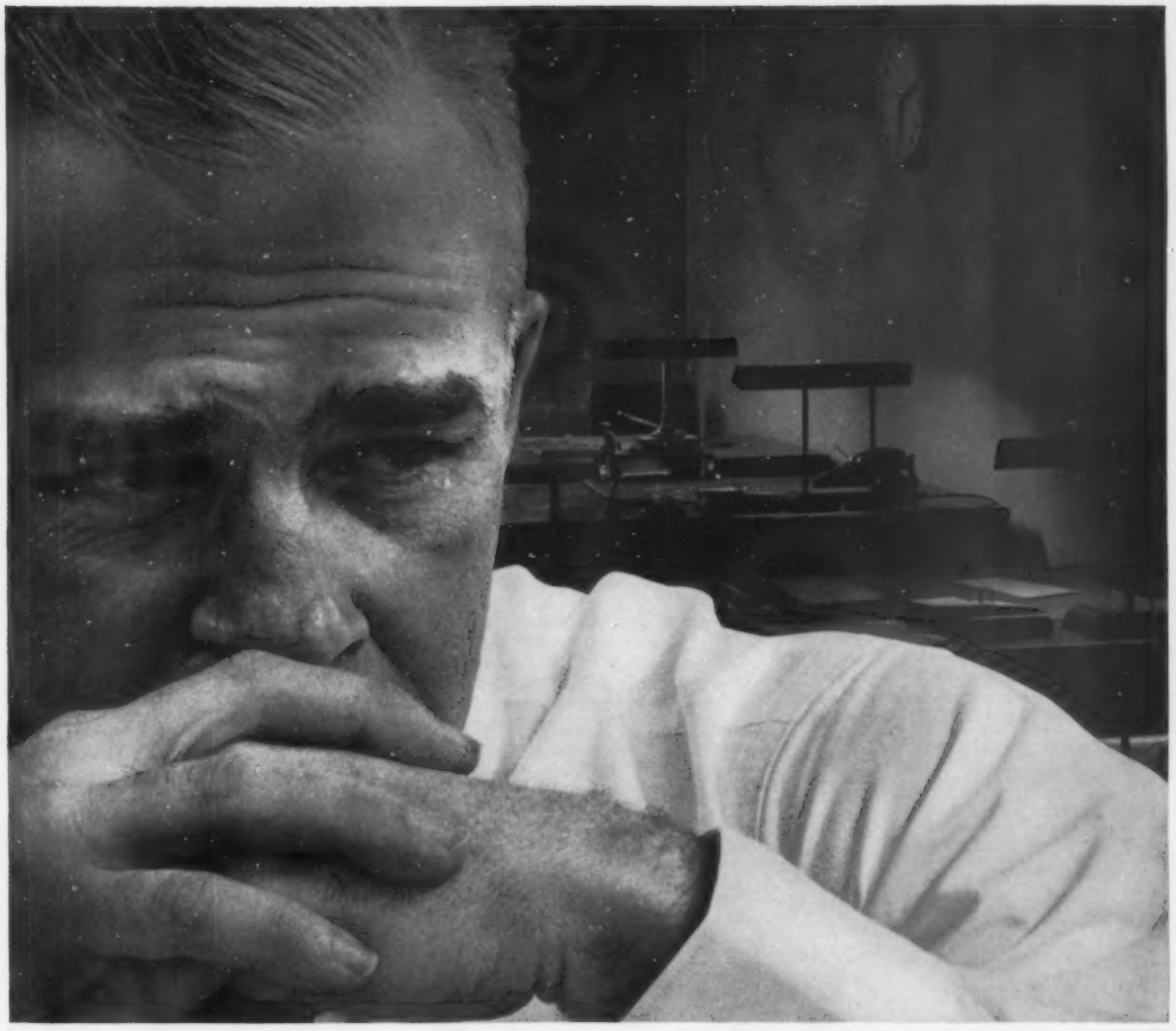
Mr. Hurlbert pointed out that the significance to the electric utility industry in the new insulation system and the resultant higher breaker settings lay in the fact that "these higher settings make possible a saving in distribution transformer investment and offer a welcome reduction in costly emergency service calls."

In addition to having a reduced number of breaker trip-outs, and a higher level of emergency capacity, there is another important advantage. Utilities will have greater flexibility in scheduling transformer change outs. This is true, because while the breaker trip setting will be raised, the setting at which the overload signal light operates, based on ASA loading guides, will remain the same. With this increased bandwidth between overload signal operation and breaker trip, a greater time can elapse before change outs are necessary in areas where load is growing.

Mr. Hurlbert added that "this Insuldur development has overcome the thermal limitation to the point where economic loading of distribution transformers is now the limiting factor."



The effect of the Insuldur stabilizing compound on aging of dried paper shown by this curve where per cent original strength is plotted against age for a given high temperature.



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- With it you save on conduit and fittings, cut installation costs.
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Notes on new utility equipment

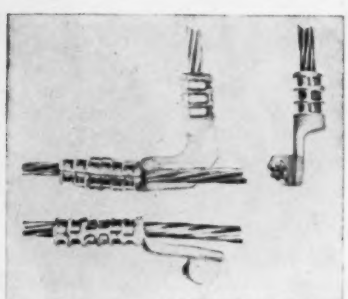
Compression taps feature quick hook over the run

NEW COMPRESSION connectors, with run and tap on opposite sides of the L-bar, so that drip from a copper run cannot fall on an aluminum tap wire and cause corrosion, have been made available by the Penn-Union Electric Co., 315 State St., Erie, Pa.

The Penn-L-Tap is quickly hooked over the run and crimped by any standard crimping tool. Especially convenient for a tap off a hot run.

It is completely marked for conductor accommodations, color - coded at both ends. The tap end is closed with an easily punctured transparent code-colored cap, which need not be removed for inserting the tap or for crimping. The run end is sealed with easily removable code-colored tape.

The Penn-L-Tap is usable on all combinations of aluminum-to-copper or aluminum - to -.aluminum. Made from pure aluminum. All contact surfaces are chemically clean, and both the run and tap elements contain Cual-Aid for positive contact. Packed in boxes with color-coded labels.



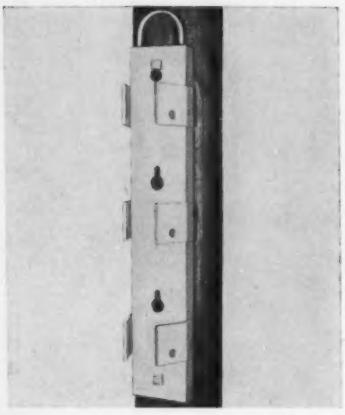
For additional data, ask for item U-401, using the coupon on page 143.

Dual-mounting bracket for single-phase transformers

A DUAL-MOUNTING bracket, designed to facilitate banking of single-phase transformers, is being manufactured by Line Material Industries, McGraw Edison Co., Milwaukee 1, Wis.

This bracket, particularly useful on open-delta circuits, accommodates two transformers, each rated from 3 kva through 50 kva.

Sturdy, all-welded, lightweight construction expedites installation, affording economies in time and labor. A complete assembly of bracket and transformers may be erected simultaneously. Keyhole slots simplify mounting on prepositioned through bolts. The slots match standard transformer mounting lugs.

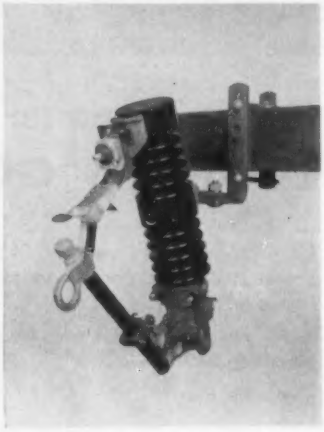


Standard EEI-NEMA transformer mounting hole spacings are employed. Electrical and physical clearances meet EEI-NEMA requirements, including those for sidewall-mounted bushing transformers. Each bracket is hot-dip galvanized to resist corrosion.

For additional data, ask for item U-402, using the coupon on page 143.

Open dropout cutouts with doubled capacity

EXTRA HEAVY DUTY cutouts with twice the interrupting capacity of the existing heavy duty units are now available from the General Electric Company's Distribution Transformer Dept., Schenectady 5, N. Y.



A completely new design of the fuse link holder enables the 7.8 kv cutouts to be boosted from 5,000 to 10,000 amps and the 15 kv line from 4,000 to 8,000 amps rated interrupting capacity at 60 cycles.

The fuse holder, made of extremely tough fiberglass reinforced polyester resin, has an expendable cap action. Under low fault currents gases are expelled downward, and under high fault currents the gases are vented both down and up.

However, the new fuse holders are interchangeable with previous models and can be used in many existing G-E open cutout frames.

The new extra heavy duty ratings make possible more widespread application of cutouts on distribution systems and will allow for future system growth.

For additional data, ask for item U-403, using the coupon on page 143.

Breakdown voltage variable in new cable fault locater

A DEVICE used to pinpoint within a few feet defective insulation determined through high potential testing of electric power cables, or faults developed in service — called the Thumper — is available from Associated Research, Inc., 3777 West Belmont Ave., Chicago 18, Ill.

This precision fault locating is achieved regardless of length of cable by the conversion of high voltage, low current output of a d-c high potting instrument into a high voltage, high current impulse supply.

A sphere gap is adjustable from the outside of the unit so that the breakdown voltage may be varied to suit the fault of the cable being tested. The test potential and repetition rate of the pulse voltage may be varied to suit existing conditions. The exact location of the fault may be determined in many cases by moving along the cable and listening for the point at which the tracer signal breaks across the fault.

The Thumper fault locater is rated at 25 kv. The great available energy permits high instantaneous peak currents which result in an extremely loud discharge, even though the fault is some distance from the point of test.

This instrument is designed for use as an accessory with any d-c high voltage breakdown tester or power supply.

The unit is approximately 15" wide x 15" deep x 15" high and weighs about ninety pounds.

For additional data, ask for item U-404, using the coupon on page 143.

Aluminum cable trough in wide range of fittings

CABLE TROUGH is now offered in expanded aluminum to supplement the expanded galvanized steel cable supports from T. J. Cope Division of Rome Cable Corp., Collegeville, Pa. The new aluminum cable supporting

ALLIS-CHALMERS
low voltage
switchgear

Here's

Proven Accuracy

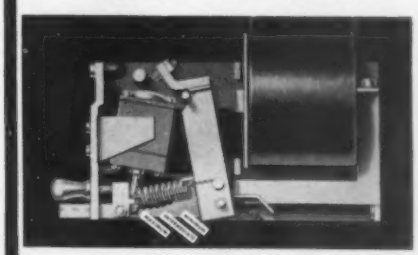
3 independent elements available in series trip device

This time-proven feature of Allis-Chalmers low voltage switchgear provides:

- **Accurate settings** — Adjusting knobs with calibration scales on front of trip device permit operator to adjust elements independently and set pickup for long time (80-160%), short time (500-1000%), and instantaneous (500-1500%).
- **Accurate action** — Silicone oil-filled, positive displacement time-delay device is completely calibrated and sealed under vacuum.
- **Accurate adjustment** — Minimum, maximum and intermediate time-delay band settings are field adjustable for each pickup value for fine selectivity.
- **Accurate indication** — Overcurrent trip flag to indicate phase which caused tripping of breaker is available.

Each trip element has its own armature and each armature acts directly on trip block. Accurate trip device is only one feature of Allis-Chalmers low voltage switchgear. For complete details, call an A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Operator inserting circuit breaker using positive-position pantograph. Note trip device accessibility, dead-front breaker, and drawout interlock.



Cutaway shows arrangement of components in Allis-Chalmers direct-acting series trip device. Note calibration scale below adjusting knobs and time band setting on armature extension.

A-5553

ALLIS-CHALMERS

system includes a wide range of standard fittings to provide simplicity, flexibility, and low cost in installation.

Aluminum cable trough offers many advantages. Its light weight reduces installation costs as entire sections may be lifted into place after assembly and awkward spaces are reached more easily. Aluminum also offers resistance to many corrosive atmospheres.

Cope aluminum cable trough is manufactured with solid sides for greater strength. Sections are secured by flat pins driven between interlocking barrels. Straight lengths are available in widths of 6, 9, 12, 18, and 24 inches and in 8, 10, and 12 foot lengths, the same size as expanded galvanized steel.

For additional data, ask for item U-405, using the coupon on page 143.

D-c to a-c converter extends use of relays and instruments

A CURRENT CONVERTER providing a direct current output proportional to an alternating current input has been announced by the Weston Instruments Division of Daystron, Inc., 614 Frelinghuysen Ave., Newark 12, N. J.

This transformer - rectifier assembly, designated as Model 9886 Current Converter, is intended primarily for use with Weston d-c instrument type relays or Weston recording potentiometers, but is equally appli-

cable with indicating instruments or other devices having input characteristics matching specified outputs.

The Weston Model 9866 is available in three types for 60 cps use in current circuits up to five amperes. One type is designed for d-c output of one milliampere into 100 ohms, and is intended for use with indicating instruments and Weston Sensitrol relays. Another type provides a d-c output of five milliamperes into 100 ohms and is intended for use with Weston sensitive relays. The third type of the new Weston Current Converter is for 50 mv open circuits d-c output, and was developed for use with null-balance devices such as indicating or recording potentiometers.

The low cost of this new addition to the Weston line of relays and controls will permit a-c current applications for instruments which formerly were not considered practical. It can be mounted in any position, and installation is very simple. If additional converters or other current measuring devices are used they may be connected in series with the new unit.

For additional data, ask for item U-406, using the coupon on page 143.

Two men set poles with hydraulic tool

HYDRO-PIKE, manufactured by San Joaquin Hydraulic, Inc., 546 M St., Fresno, Calif., is a new hydraulic tool that makes pole-setting and maintenance a two-man job. Designed and developed by a line foreman of one of the nation's largest utility companies, it operates as simply as an automobile jack, yet a pair of them easily aligns the heaviest poles.

Heavy steel and malleable cast throughout, the tool weighs only 28 pounds and is just 51 inches long. It has an hydraulic lift of 18 inches and a 3000-pound capacity, supplied by a

standard hydraulic unit. Service is available anywhere. A safety cap on the pike end is designed to prevent injuries.

Hydro-Pikes have already been installed as standard equipment by a number of the West's largest utilities, following exhaustive field tests that prove them safer, faster and far more economical than old-fashioned wooden pikes. They are particularly useful where working space is limited. An auxiliary foot is available for use on cement or other hard surfaces to assure proper alignment and a safe, firm footing.

For additional data, ask for item U-407, using the coupon on page 143.

100 kvar individual capacitors announced

THE CORNELL-DUBILIER Electric Corp., 333 Hamilton Blvd., South Plainfield, N. J., has announced their individual capacitor units rated to deliver a full 100 kvar.

The "One Hundred" is available in standard voltage ratings of 4800, 6640, 7200, 7620 and 7960 volts. Each unit produced will be full-voltage energization tested as an exclusive quality control measure, before being passed for shipment, as are all C-D power capacitors.

Nearly one-half mile of aluminum foil is carefully wound into the sections of each 100 kvar capacitor. The multiple layers of highest purity kraft paper used would measure some two and one-half miles if unrolled to full length.

The new 100 kvar capacitors are expected to enjoy wide power industry acceptance, since they will permit lower installation costs per kvar, savings in space required for substation racks, and more compact pole

mounted banks. Both single bushing and two bushing styles will be produced to allow the greatest possible flexibility of application.

For additional data, ask for item U-408, using the coupon on page 143.

Two-cycle, 13.8 kv metal-clad switchgear

THEIR FIRST LINE of metal-clad switchgear with 2-cycle, 13-8 kv magnetic air breakers has been announced by the General Electric Co., of Schenectady 5, N. Y. Designed to minimize damage that can result from line burning, the new 2-cycle breaker is interchangeable with existing magne-blast breakers within rating.

In announcing the new 13.8 kv magne-blast power circuit breaker, company engineers said the breaker will provide these benefits to utility customers: reduce line burning; better protection against conductor annealing during faults which may re-

Sangamo J2 Meters

CLASS 100 AND CLASS 200

Give you all the revenue you've got coming

Sangamo watthour meters start on a 9 watt load and measure accurately to full 100 or 200 amperes. Will fully record the lightest loads of today and the heaviest loads of the future.

Give you all-weather accuracy

Corrosion-resistant finishes and materials are used throughout J2 Meters. You get optimum performance in humid, salt-laden or corrosive industrial atmospheres.

Give you protection against surge voltages

The extremely high insulation level of J2 Meters withstands high-voltage surges without damage. Highly surge-resistant Alnico damping magnets resist the de-magnetizing effects of lightning.

Give you sustained accuracy at all loads

Sangamo J2 Meters have the highest starting torque in the industry. Their accuracy is not affected by friction caused by foreign matter—even down to the lightest loads.

Give you slowest disk speed

Only 10 revolutions per minute at full nameplate rating means longer meter life—and pleases meter-watching customers, too!

...AND ARE GUARANTEED FOR LIFE!

Now, an unprecedented lifetime guarantee—covering materials, workmanship and *bearing systems*—is offered on all Sangamo J2 Meters.

JM58-1

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

duce or impair mechanical strength; and better coordination with distribution protective devices.

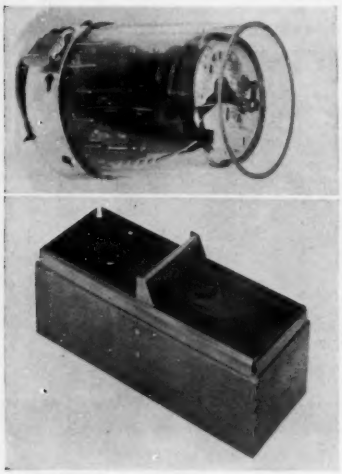
Availability of a 2-cycle, 4.16 kv unit was also announced.

For additional data, ask for item U-409, using the coupon on page 143.

Meter holders, carriers provide safety protection

THE ALUMINUM BOX SHOP, Inc., 355 Greco Ave., P. O. Box 912, Coral Gables, Fla., has announced a new line of Meter-Gard carriers and safety holders to facilitate meter handling and to protect operator from injury.

The carriers come in two- and three-meter tandem units. The latter unit accommodates either two "A" base meters or three-socket meters and provides a convenient and compact means of handling meters without breakage, through the service shop to the job site, as well as a method of storing items in the meter department.



Meter-Gard safety holders, made of 5/32" plexiglass, mount over the meter, protecting the operator from injury, and the meter from breakage, either on insertion or removal.

For additional data, ask for item U-410, using the coupon on page 143.

Overhead lines connections covered in 100-page manual

COMPREHENSIVE, up-to-date information on electrical connections for overhead lines in transmission and distribution is available for the first time in one convenient publication, the 100-page manual on connection techniques, connectors, and installation tooling issued by Burndy Corp., Norwalk, Conn.

Basic principles of splicing, tapping, deadening, and other applications are explained for the linesman, as well as the engineer, with photographs, drawings, and charts supplementing the easy-to-read text. Low resistance, stability under varied conditions, economical installation and other electrical connection requirements are covered. An entire section is devoted to recent progress in connecting aluminum.

An illustrated selector chart makes it easy to find information on connectors for specific applications and types of conductors. Complete technical data on connectors, tools, and accessories are organized for ready reference.

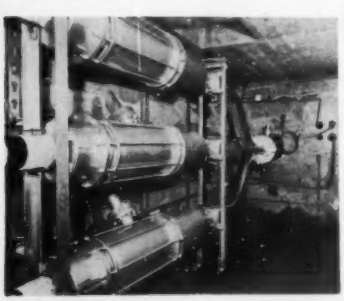
For additional data, ask for item U-411, using the coupon on page 143.

Interconnecting stop joints usable on all cable systems

STOP JOINTS to interconnect power cable systems having up to 200psi nominal pressure differential on the pressure media have been developed by G & W Electric Specialty Co., 3500 W. 127th St., Blue Island, Ill.

Hi-Lo joints, designs for which have been made for conductor sizes up to 2750mcm, may be adapted to all high voltage power cable systems. Pressure systems of cables being connected are completely isolated from each other by porcelain stop tubes. Multiple copper strap connections between cable connectors make possible a complete current path without placing mechanical stress on the stop tubes even with some misalignment of connecting parts. Entrance fittings are provided for treating, filling, and monitoring the pressure media.

Mechanical and electrical test results on stop joints to connect 69 kv low pressure oil-filled cable with high pressure oil-filled pipe-type cable proved satisfactory, the company claims. No evidence of distress, such as carbonization or tracking, was found upon visual inspection and dissection of the joints.

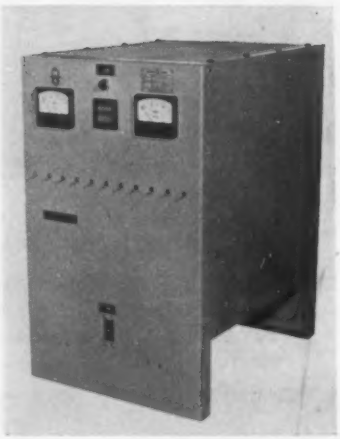


For additional data, ask for item U-412, using the coupon on page 143.

Standardized load bank for artificial loads

A COMPLETE LINE of standardized load banks for obtaining artificial electrical loads has been announced by Ward Leonard Electric Co., 115 MacQuesten Parkway South, Mount Vernon, N. Y.

Ordinarily, load banks for specific jobs are specially designed and built to order, oftentimes at high cost with relatively long delivery. Now with this concept in load bank design the purchasing engineer is offered a wide range of loading resistors and switch selection in combination with standard size enclosures and mountings.



Each load bank consists of a sturdy, metal framework; pre-wired resistance elements; terminals for external connection and load section switching components where needed. Elements are Ribflex(R) or Barohm(R) ribbon type resistors.

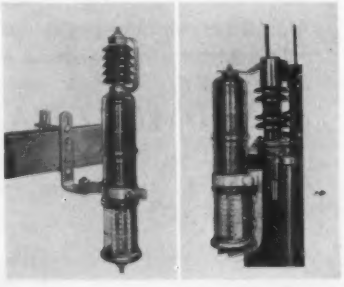
Recommended for use by testing labs, jet engine and motor manufacturers, communications equipment makers, etc., these load banks are available in capacities up to 70 kw per unit, 600 volts max. Multiple units may be combined where higher capacities are required.

For additional data, ask for item U-413, using the coupon on page 143.

Pyrex-housed external-gap heavy duty arresters

A NEW FAMILY of pyrex-housed arresters is being manufactured by Line Material Industries, McGraw Edison Co., Milwaukee 1, Wisc. The new heavy-duty arresters combine an external gap with the excellent electric characteristics of valve and internal-gap construction.

Available voltage ratings of the new arresters are 3, 6, 9, and 10 kv.



Arresters for crossarm, pole, and wall mounting, designated type TX, have an external gap insulator. Type

SMOOTH BORE!

Orangeburg Fibre Conduit Prolongs Cable Life

Protect cable sheath from abrasion and you prolong the life of underground cables, say utility engineers. Scoring of cable sheath creates "trouble spots" that shorten cable life.

That's where Orangeburg Fibre Conduit plays an important part in keeping cables healthy. Orangeburg's smooth bore, its low coefficient of friction minimize the danger of abrasion when cables are pulled in, as well as later on during cable movement. By protecting cable sheath from abrasion, Orangeburg Fibre Conduit adds years to cable life.

Orangeburg's impermeable wall and watertight joints protect cables from corrosive ground waters. Its nonmetallic material is strong, tough, resilient, long lasting.

And, remember, Orangeburg lays faster and at lower cost than other types of conduit. It is light in weight, easy to handle, easy to tool on the job. Spacers, bends, fittings, 5° bend sections and lightweight tapering tool, all combine to simplify installation.

Since 1893, records of long life have proved Orangeburg's durability and economy.

Orangeburg Fibre Conduit is distributed by Graybar Electric Company and General Electric Supply Company with branches and stocks in principal cities.

Another fine product!

Underfloor Duct by ORANGEBURG®

For Distribution of Electrical Wiring in Commercial, Industrial and Institutional Buildings

Since 1921 Non-Metallic Underfloor Duct by Orangeburg has been selected for many of the country's outstanding buildings because of its safety, flexibility and low installed-cost. To learn how an Orangeburg Underfloor Duct System keeps a building *electrically* modern for its lifetime, write for Catalog 201.

WRITE DEPT. ES-48 FOR NEW CATALOG 52.

ORANGEBURG MANUFACTURING CO., INC., Orangeburg, N. Y. **West Coast Plant, Newark, Calif.**

ORANGEBURG®
FIBRE CONDUIT

T arresters are mounted directly on transformers or regulators.

The pyrex housing provides positive and constant visible evidence of an arrester's ability to give complete protection. It makes practical field inspection and elimination of arresters damaged internally by successive heavy surges.

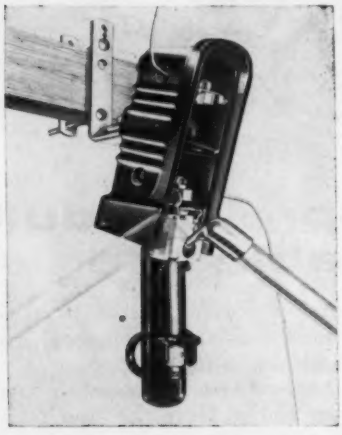
The open series air gap and the internal gay of T and TX arresters can each withstand normal line operating voltages. Thus, arrester operation is not affected by momentary shorting of the external gap by a bird, animal, or insect. An arrester damaged maliciously or by a severe lightning surge does not cause a system fault because the external gap prevents line lockout.

Types TX and T arresters meet all the test requirements specified in proposed AIEE lightning arrester standards 28-B and the latest provisions of NEMA LA-1-5-1952.

For additional data, ask for item U-414, using the coupon on page 143.

Porcelain-enclosed cutout converts by changing doors

THE A. B. CHANCE Co., of Centralia, Missouri, announces a new porcelain-enclosed cutout—the Type "E." The



door of the Type "E" can be completely installed and removed, from any angle, with a standard hookstick. Interrupting capacity ranges from 2,000 to 10,000 amperes, and fuse operation is visually indicated by either an indicator flag or by 180-degree drop-out action. Contacts, terminals, hinge trunnion, and mounting hanger are cemented to the housing with epoxy resin, a substance that has great strength under mechanical loading.

The Type "E" is made in the complete range of NEMA ratings in 5.2 and 7.8 kv-50 and 100 ampere cutout models and 100 and 200 ampere disconnecting-cutout models.

Conversion to higher interrupting capacity or to disconnect is accomplished by merely changing doors. Each cutout is color-coded in conformance with NEMA recommendations. Terminals are coated with Chance fortified cadmium for either aluminum or copper conductors:

50-amp terminals accommodate #8 solid to #2/0 stranded or #1/0 ACSR; 100-amp terminals accommodate #6 solid to #3/0 stranded or #2/0 ACSR. A link ejector is provided to assure low-current interruption. The heaviest-duty models are equipped with gas barriers and special fiberglas fuse-tubes.

For additional data, ask for item U-415, using the coupon on page 143.

Aluminum U-bolt parallel clamps

PERIPHERAL enclosure of conductors, over the entire range from maximum to minimum, is provided by Type ADC U-bolt parallel clamps, manufactured by Penn-Union Electric Corp., 315 State St., Erie, Pa.

The specially designed (patent pending) wrap-around construction keeps the sides of the center spacer always in contact with the cap and the bottom plate, forming a continuous wall of metal that completely encloses any size conductor within the clamp's range.

This exceptionally complete enclosure minimizes cold flow, at low cost. And the generous contact areas give high pull-out.

To provide for reliable service of these fittings on both aluminum and copper conductors with no danger of galvanic action, heavy sections have been provided; the well-known mass anodic effect protects the aluminum conductor from attack.

Penn-Union Type ADC clamps are available with one, two or three aluminum alloy U-bolts, for a complete range of conductor sizes from No. 6 to 900MCM, ACSR. Each size accommodates a range of Aluminum, ACSR or Copper in either groove.

Caps and bodies are of high strength aluminum conductor alloys. Spacers are pure soft EC aluminum, conforming to conductor stranding, and are acid-alkali etched and grease-coated to provide an oxide free, clean metallic contact surface.

For additional data, ask for item U-416, using the coupon on page 143.

Quick-break device for power switches

A POWER-SWITCHING accessory designed to reduce arcing hazards and prevent phase-to-phase faults is available from Line Material Industries, 700 W. Michigan, Milwaukee 1, Wis.

Type PA quick-break devices aid in switching light loads, line-charging currents, and transformer magnetizing currents. They are applicable to the company's horizontal-break and vertical-break switches rated 600 amperes at 7.5, 15, 23, 34.5, 46, or 69 kv.

Snap action of the quick-break rod, at a predetermined open-gap position of the switch blade, interrupts currents rapidly and safely. Speed of the rod tip during interruption is independent of the speed of opening the switch.

Other features include simplicity of field installation, isolation of beryllium-copper rod from current path

when switch is closed and controlled action of the rod after an interruption.

For additional data, ask for item U-417, using the coupon on page 143.

Sinusoidal wave form provided for relay tests

FOR THOSE RELAY departments that require sinusoidal waveform in testing protective relays (definite minimum time relays), the Model 1010/RB Reactor-Booster is available from the Multi-Amp Corp., 465 Lehigh Ave., Union, N. J.

The Reactor-Booster provides additional capacity to MULTI-AMP relay test instruments or other loading de-

vices, and also additional impedance into the circuit to suppress the third harmonic currents introduced by the relay under test. The resulting waveform is sinusoidal and the curves established are identical with that of the manufacturer of the relay.

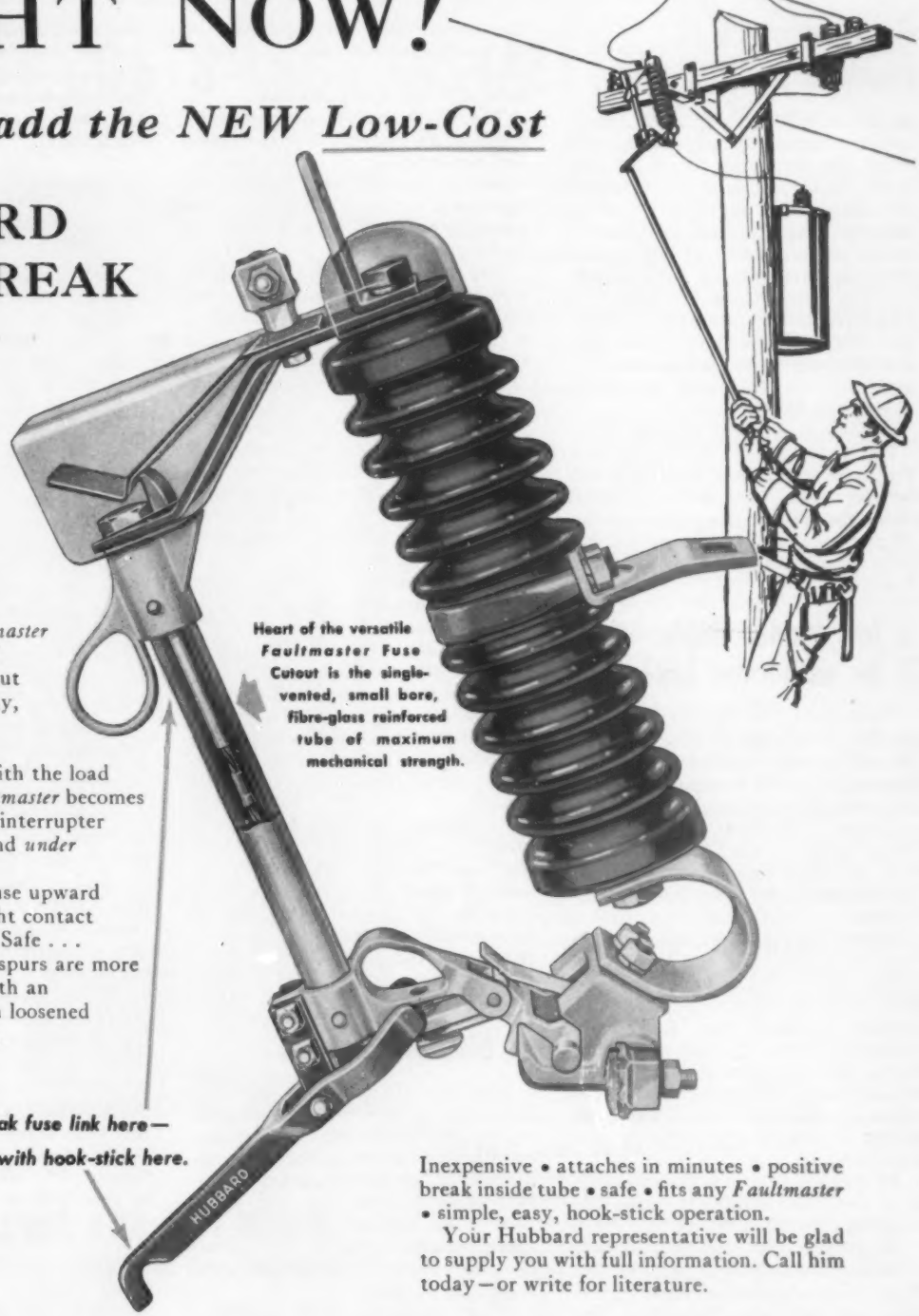
The Reactor-Booster is portable and can be quickly connected to any existing transformer load or testing device.

For additional data, ask for item U-418, using the coupon on page 143.

TOMORROW! TODAY! RIGHT NOW!

You can add the NEW Low-Cost

HUBBARD LOADBREAK LEVER



Yes! Now you can attach mechanical load break levers to any Hubbard *Faultmaster* Cutout regardless of whether they were put on the lines yesterday, last month, last year or years ago.

When equipped with the load break lever the *Faultmaster* becomes a safe, positive load interrupter *anywhere, anytime* and *under any rated load.*

Positive . . . because upward thrust maintains tight contact during interruption. Safe . . . because a lineman's spurs are more deeply embedded with an upthrust rather than loosened by a downward pull.

Heart of the versatile *Faultmaster* Fuse Cutout is the single-vented, small bore, fibre-glass reinforced tube of maximum mechanical strength.

To break fuse link here— Push up with hook-stick here.

Inexpensive • attaches in minutes • positive break inside tube • safe • fits any *Faultmaster* • simple, easy, hook-stick operation.

Your Hubbard representative will be glad to supply you with full information. Call him today—or write for literature.

Makers of the famous Autogap Lightning Arrester.

HUBBARD AND COMPANY • 6301 BUTLER ST., PITTSBURGH 1, PA.

CHICAGO 50, ILLINOIS • OAKLAND 8, CALIFORNIA • PLANO, TEXAS

Know the law

by Arthur L. H. Street

Certified check required for bids

◆ WHAT HAPPENED in New Jersey could happen in any state, and what the Supreme Court of that state decided might be followed by almost any appellate court. A statute specified that no municipality should contract for public work involving more than $1,000, without advertising for bids and awarding the contract to the "lowest responsible bidder." (In 1957 the law was so amended as to apply only to contracts involving more than $2500.)

A township called for bids to install two sirens at school premises. The notice required that each bid be accompanied by a certified check payable to the township for 10 per cent of the amount bid. No such requirement was made by the statute.

Is low bidder liable if he withdraws bid?

Defendant, an electrical contractor, was lowest bidder, but he did not file a certified check. The township board accepted the bid but defendant refused to take the contract, and the contract was awarded to the next lowest bidder. The township then sued defendant for the increased price that was involved.

Defendant resisted the suit on two grounds: (1) He misunderstood that the work was to be done according to specifications of a similar project that had been abandoned. (2) His bid could not be turned into a valid contract, although accepted by the board, because he had not filed a certified check to insure his entry into a contract.

In other words, it was contended that the board could not waive the requirement for a check.

Was defendant entitled to dismissal of the suit? Yes, decided the New Jersey Supreme Court in the case of Hillside Township vs. Sternin, 136 Atl. 2d 265.

The court did not directly pass upon defendant's excuse that he misunderstood the nature of the specifications that were to be followed. But the court did intimate this excuse was not valid because he had neglected the opportunity to fully inform himself as to the nature of the specifications.

The court upheld argument by defendant's lawyers that the board had no right to act on his bid because it was not accompanied by the check required by the bidding conditions. Here is the gist of the decision:

The requirement for furnishing security for entry into a contract for public work, on acceptance of a bid, is generally imposed throughout the country and is "deep rooted in sound principles of public policy."

"The purpose is to secure competition and to guard against favoritism, extravagance and corruption. Statutes directed towards these ends are for the benefit of the taxpayers and not the bidders; they should be construed with sole reference to the public good; and they should be rigidly adhered to by the courts," the court held.

"Our statute * * * requires public advertisement for bids and award of the contract to the lowest responsible bidder. Of course, the advertisement could contain the specifications and all of the conditions upon which proposals are sought.

"However, there can be no doubt about the propriety of depositing the specifications at some convenient place where they are available to all interested parties, so long as adequate reference is made thereto in the public notice.

Public advertisement of bids and awards

"Nor can there be any question as to the validity of the inclusion in the advertisement of additional conditions of bidding, such as a requirement for the deposit of specified security with the bid. Such factors in conjunction with the specifications establish and measure the obligation of persons who seek the contract.

"The conditions and specifications must apply equally to all prospective bidders. Otherwise, there is no common standard of competition. Every element which enters into the competitive scheme should be required equally for all and should not be left to the volition of the individual aspirant to follow or to disregard and thus to estimate his bid on a basis different from that afforded the other contenders. * * *

Is contract valid if requirement waived?

"So it follows that all bids must comply with the terms imposed, and any material departure therefrom invalidates a nonconforming bid as well as any contract based upon it. If this were not the rule, the mandate for equality among bidders would be illusory and the advantages of competition would be lost. * * *

"The financial capacity of a bidder is a material and substantial consideration in connection with the award of contracts for public work. Manifestly it is one element which must enter into the determination of responsibility; the statute itself speaks of the lowest 'responsible bidder.'

"In this connection, obviously the Legislature regarded that factor as important because it adopted a separate act to provide municipalities with a means of requiring a prospective bidder to furnish in advance a statement of his financial ability. * * *

"And in our judgment a demand in a public advertisement for the deposit of some form of security as a guaranty that the contract will be entered into if the bid is accepted, is properly imposed as an aid to the governing body in reaching its decision. Moreover, the deposit is material for another reason.

"It is recognized that failure of the successful bidder to execute the contract results in its forfeiture, * * * and the specifications so provided in this case. Thus, in most instances the municipality may be made whole for any resulting loss or expense by summary action without having to sue for damages.

"Consequently, there would appear to be no rational support for an argument that the demand in the advertisement for a certified check of the percentage stated was

(Continued on page 139)

Quality makes the big difference in close quarter installations

install Republic ELECTRUNITE E.M.T. because

THE BEST COSTS LESS INSTALLED

Addition to St. Luke's Hospital, Milwaukee, Wisconsin, is a typical example of a Republic ELECTRUNITE close quarter installation. Architect: Grassould & Johnson; General Contractor: Siesel Construction Company; Electrical Contractor: Bently Electric Company.

Install Republic ELECTRUNITE® E.M.T. Deliver a top quality job at the best bid because... the *best* costs *less* installed. Built-in quality makes the big difference.

Republic ELECTRUNITE E.M.T. is produced from highest quality flat-rolled open-hearth steel made in Republic's own mills and carefully inspected to Republic's rigid manufacturing requirements. Quality is built-in.

Republic ELECTRUNITE "INCH-MARKED" in feet and inches up to 1¼" sizes is an exclusive easy-to-use feature that offers installation economies. Full length "GUIDE-LINE" keeps bends in line, saves wasted time and material. And "INSIDE-KNURLING", another exclusive ELECTRUNITE feature, makes wire pulling as much as 30% easier. Additional examples of Republic's built-in quality.

Lightweight, easy-to-handle ELECTRUNITE is the most practical and economical raceway in close quarter installations, too. To make tight joints, simply tighten the fitting, not the entire run—a real aid where working space is limited.

And because quality is built-in Republic ELECTRUNITE E.M.T. meets building code requirements...is produced to A.S.A. Specification C.80.3 and Federal Specification WW-T-806, (latest revisions) and carries the Underwriters' Laboratories Seal of Inspection.

Install quality—install Republic ELECTRUNITE E.M.T. For additional information call your Republic ELECTRUNITE distributor or send coupon today.

REPUBLIC STEEL
STEEL AND TUBES DIVISION

REPUBLIC STEEL

Cleveland 8, Ohio

REPUBLIC STEEL CORPORATION
STEEL AND TUBES DIVISION
DEPT. C-5065-A
227 EAST 131st STREET • CLEVELAND 8, OHIO

I would like to learn more about Republic ELECTRUNITE "INCH-MARKED" and "GUIDE-LINED" E.M.T. features.

Name_____ Title_____

Firm _____

Address _____

City_____ Zone____ State_____

Contractors tell how

Contractor airs views on licensing

By S. W. Osmundson
Electrical Contractor
Wheaton, Md.

◆ FOR SEVERAL YEARS there had been no licensing of contractors nor laws controlling the quality of their performance in this area. During a four year period, for example, a total number of approximately 33,000 permits to homeowners and self-styled electricians were issued for electrical work on the payment of a nominal fee. Inadequate workmanship by individuals, and inadequate workmanship by contractors too, sometimes occurred.

The decision to enact a license law was made and its purpose was to provide for better inspections and for the enforcement of minimum standards for public safety. The contractor was also put under bond.

No one can dispute the merits of licensing. It is vitally important. It is a necessary practice for establishing standards of performance, for qualifying applicants for carrying out those standards, inspecting to see that minimum requirements have been adequately met. Not only is the public protected but the contractor is recognized in his trade as qualified and competent. Licensing clears the field of jacklegs, removing unqualified competition for the legitimate trade.

However, in the licensing of electricians, an examination was a requirement for all. Those with 15 and 20 years of experience, like all others, were required to pass a written examination. Many who were worthy, skilful and conscientious mechanics, but no longer practiced in the handling of the written word, could not describe nor explain procedures and reasons on various types of jobs they had been carrying out expertly day in and day out for years. They were denied a license in a trade they were adept at.

Severin W. Osmundson works at panel where a residential wiring job called for heavying-up the service.

I would like to see all contractors who apply for a license get one automatically. No written examination should be necessary to obtain a license.

But if a written examination must be a requirement in the future, I would like to see examinations and licensing controlled by a five-man board. Comprised of a senior eiectrical inspector and contractors appointed for two year terms, the board should have a rotating system whereby a new board member replaces yearly one whose two-year term has expired. No one board member could succeed himself for two consecutive terms. At the end of three years, for example, there would be two new members, two members who had served one year each, and one old member. A rotating system plus prescribed duties for the senior electrical inspector would preclude domination of the board by any member or group.

The board would be empowered to grant a license where an electrician's long and competent record spoke for itself though he failed to pass a written examination. The inspection authorities whose prime job is inspections could judge the job on its own merits rather than who had carried it out.

Ingenuity sparks contract profit

By Harry J. Miller

◆ VENICE ELECTRICAL Engineer and Contractor Henry West Baukat has proved a striking parallel between the old saw that "old soldiers never die," and that the metal light standards used by the city of Venice have a similar longevity.

When the Florida city's solons decided its mushrooming growth warranted a revamping of its street lighting system, because firstly the poles didn't fit the "new look" the town was rapidly assuming under

These poles formerly comprised the lighting installation on city streets of Venice, Fla. Their "second" career proved a profitable undertaking for Contractor Baukat.

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the impetus of new business expansion, and because broken glassware atop the lighting standards posed a continuing hassle in maintenance, Baukat contracted to remove the poles—all 65 of them—including their heavy concrete bases, in return for ownership of the rusting poles. Of the more than three score units, Baukat managed to salvage 35. By the time he hired an auto wrecker to chain them out of the streets and haul them off in a flatbed trailer, it might have seemed questionable if the contractor had made a good investment in the units.

But he sold off the stems; used the extra concrete bases on a property seawall, and sold the cast iron of the junked poles as scrap.

Then he made a deal with the Harbor Lights Trailer Park which had located in the area and which rented trailer space on inland lots as well as waterfront lots along the shores of Roberts Bay.

To light up the area which houses 153 spaces for trailers, Baukat installed 23 of the pole fixtures he'd salvaged, to make a most attractive lighting installation for the trailer park, in keeping with its slogan: "Where a millionaire would choose to live."

Each fixture carries a 150-watt bulb, and an underground installation of #12 UF wire hooks up the circuits. Baukat dug the holes for the fixtures; poured the concrete for their bases. Each trailer lot is wired with #6 RR, providing a 75 amp service in anticipation of air conditioning loads and the abundance of electrical appliances coming into increasing use by trailer-dwellers.

Electrician M. C. Mitchell enjoys all the benefits of his nineteen years of service with the company. In addition to regular dividends from his company stocks, he receives a sizable Christmas bonus, sick benefits, and paid life insurance policy premiums.

Stock purchase plan pays-off

By Melvin L. Thacker

Secretary-Treasurer
Walter C. Davis & Son, Inc.
Alexandria, Virginia

◆ ONE OF THE PERSISTENT problems contractors discuss is labor turnover in the shop. How to retain skilled personnel concerns most of us, particularly where an operation has been fortunate enough to acquire conscientious, proficient mechanics of high morale.

We believe the key lies in employer-employee relations. Wages, sick leave, paid vacation, consideration during slack times, and yes, even a share in the profit to root employees in the business and give them motivation for wanting to turn in their best.

Of the twenty men who form the nucleus of our staff, there are two men who have been with us over twenty years, five men over fifteen years, four men over ten years, five men over five years, and among our four helpers two to three years. Several of these electricians have had interrupted employment with us due to the wars.

In a constantly turning occupation that contractors sometimes explain away by "restlessness" and "independence" of the men, our experience indicates that under good satisfying conditions mechanics are no different from people in other occupations. Like others they want their skill adequately rewarded; they give their best when they have a stake in the operation.

For this area our electricians and helpers get a good hourly wage rate: $1.75 for helpers, $2.75 for electricians. We make all payments on a life insurance policy for each of our employees with us 10 years and over. Mechanics who are out sick over twenty hours are placed on half-time for the duration of their illness. Each man gets a paid vacation of one week.

We believe in the responsibility of our men, putting each man on his own. We do not require them to check in and out on a job. Nor do we cut back on employment in slack times. There are no lay-offs; we retain our full staff. What we do is double up our men on jobs.

In 1954 when the company was incorporated, we gave away one-fifth of our stock shares to seventeen employees who were with us at the time. In July and December dividends are paid to all employees in sizable amounts on the basis of a percentage of profit. These amounts vary with the fluctuation of the business. In July, for example, amounts ranged from $20 to $400, depending on length of service. Christmas brought bonuses of sizable amounts.

Has it paid off? Yes, it has. Every one of our men is conscientious in

(Continued on page 142)

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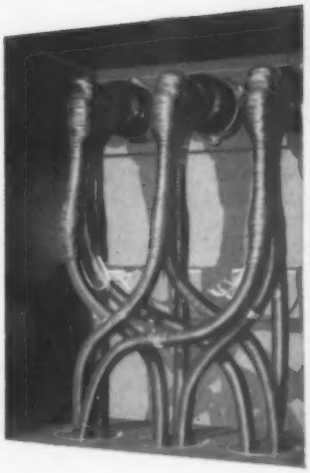

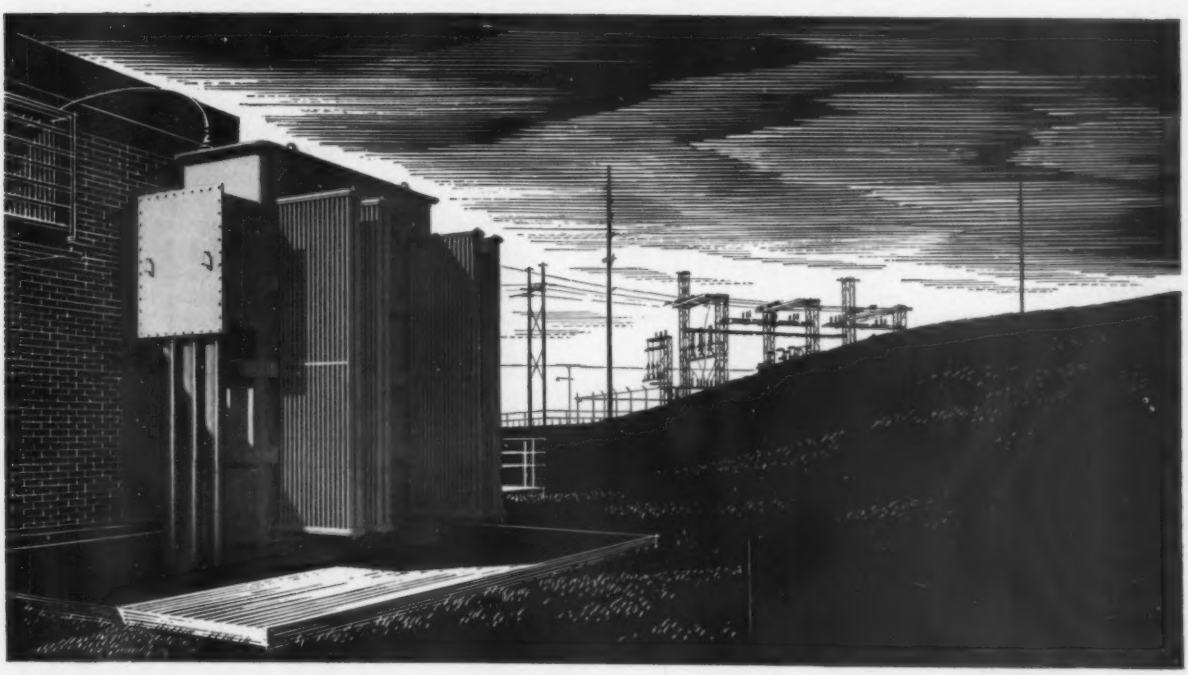

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Understanding the Code

By Walter R. Stone

This article should be especially helpful to the following readers:

- Electrical Contractors ✔
- Electrical Utilities ✔
- Electrical Wholesalers ✔
- Electrical Inspectors ✔
- Industrial Engineers ✔
- Consulting Engineers ✔

◆ THE SUBJECT of feeders can bring about high voltage arguments in every electrical crowd! Even feeder neutrals, which are not intended to carry high voltage, lend themselves nonetheless to these high potential discussions. In this issue we will have a round or two with this subject, not for the purpose of adding joules to the wire but, we hope, in order to clear the atmosphere to some small degree.

A feeder has been defined by the Code as "any conductor of a wiring system between the service equipment, or the generator switchboard of an isolated plant, and the branch circuit over-current device." That covers a diversity of conductors under varied conditions when we remember that a branch circuit consists only of "that portion of a wiring system extending beyond the final over-current device protecting the circuit."

Feeders, then, as defined by the Code, include all sub-feeders, and even sub-sub-feeders, or as many sub-divisions as there may be just so long as they exist between the service and the branch circuit overcurrent devices. The Code feeder rules apply to all or any part of this maze of wiring.

When a large feeder goes to ground or becomes short-circuited while carrying present-day loads, the resultant damage usually is extremely severe to associated equipment as well as to the feeder itself. Such disasters frequently destroy a great deal of switchgear and even transformers if the system is not properly protected by overcurrent devices capable of clearing currents of this magnitude. That is why the Code requires that "If at any time it is found that feeder conductors are, or will be, overloaded, the feeder conductors shall be increased in capacity to accommodate the actual load served."

Next comes the shouting:

Code test questions

1. A 3-wire feeder supplying three 2-wire branch circuits shall be not smaller than # 8. True or false?

2. A 2-wire feeder supplying two 2-wire branch circuits shall be not smaller than # 10. True or false?

3. If a feeder carries the total current supplied by a set of # 8 service entrance-conductors, such feeder shall be not smaller than # 8. True or false?

4. Where practicable to prevent excessive voltage drop, the Code recommends that this drop should not exceed a total of 4% to the final distribution point for a combined power and lighting load which amount is the sum of 3% for power and 1% for lighting. True or false?

5. For show-window lighting, a load of not less than 200 watts shall be included for each square foot of show window. True or false?

6. For computing feeders, the small appliance load for kitchen, dining, and laundry areas:

(a) shall be subject to demand factors.

(b) shall not be subject to demand factors.

(c) shall not be subject to demand factors unless a range is supplied by the same feeder.

Which is correct: a? b? or c?

7. Where a number of single-phase ranges are supplied by a 3-phase 4-wire feeder, the current shall be computed on the basis of a demand:

(a) according to the total number of ranges supplied.

(b) of 1/3 the maximum number of ranges connected between any two phases.

(c) of twice the maximum number of ranges connected between any two phases.

Which is correct: a? b? or c?

8. Where four or more fixed appliances in addition to electric ranges, air conditioning equipment, or space heating equipment are connected to the same feeder supplying a 3-family dwelling, a demand factor of:

(a) 70% may be applied.

(b) 75% may be applied to the fixed appliance load, but not to the ranges or space heating equipment.

(c) 75% may be applied to the space heating load only.

Which is correct: a? b? or c?

9. In computing feeder loads where two dissimilar loads are encountered such that only one will be on at any one time, such as heating and cooling loads:

(a) the larger of the two such loads may be omitted from the total.

(b) the smaller of the two such loads may be omitted from the total.

(c) an average of the two such loads may be omitted from the total.

Which is correct: a? b? or c?

10. A common neutral feeder:

(a) is not permitted.

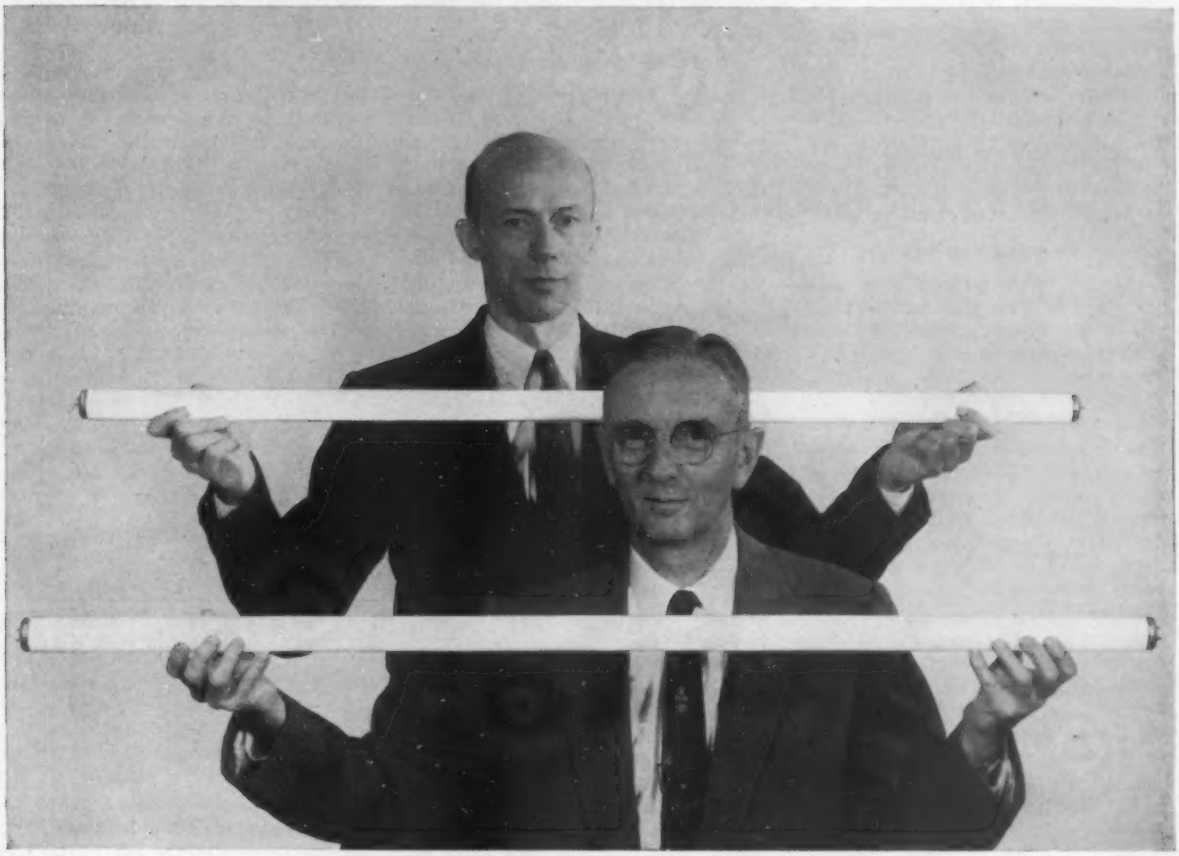
(b) may be employed for any number of feeders.

(c) may be employed for two or three sets of 3-wire feeders, or for two sets of 4-wire or 5-wire feeders.

Which is correct: a? b? or c?

Correct answers will be found at end of this article.

GENERAL ELECTRIC'S 20th FLUORESCENT ANNIVERSARY ANNOUNCEMENT:



R. N. THAYER (left) AND G. E. INMAN developed first commercial fluorescent lamp in the U.S.A. in 1938. Still with General Electric, they have been key men in many G-E fluorescent lamp improvements.

Today's G-E Fluorescent Lamps give your customers 76% more light per watt, last 5 times longer...yet cost ½ as much!

The first fluorescent, introduced 20 years ago this month by General Electric, can't hold a candle to today's G-E 40-watt Lamps. A steady stream of improvements from G.E. in Rapid Start and Pre-Heat Lamps has provided up-to-the-minute lighting systems for G-E Lamp users. Efficiency is up 76%, rated life is 5 times longer, and the list price is down 57%. *This means one G-E Fluorescent Lamp dollar today buys as much light as $20 did 20 years ago!*

NEWEST IMPROVEMENT—"BONUS PHOSPHOR" This revolutionary new G-E process gives your customers 7 to 9% more light by selecting only the bigger, brighter phosphors to be used in G-E Lamps. It is another dollar-and-cents reason why they get more for all their lighting costs with General Electric Lamps.

This "Bonus Phosphor" is now available in the 40-watt and new Power-Groove—and will soon be used in all G-E fluorescent lamp types. For the whole "Bonus Phosphor" story—see or write your local General Electric Large Lamp Salesman.

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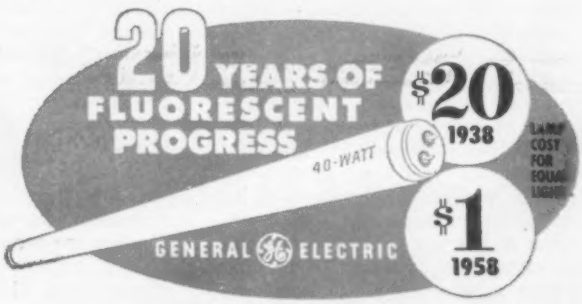

"Why," it is so often asked, "does the Code turn right around, then, and offer all kinds of ways of applying demand factors in an underhanded way of contradicting its own requirement to accommodate the actual load?" I think I can clear up this confusion by explaining what is meant here by the Code term of "the actual load served."

Demand factors

There is often quite a large difference between the actual load served at any one time and the total connected load. It is this difference which the Code recognizes as subject to demand factors.

Furthermore, the demand factors permitted by the Code were not pulled out of the air arbitrarily in a hopeful keep-your-fingers-crossed fashion. Such factors were arrived at after careful study and after many tests were made of many actual installations in each representative class.

Test after test, for instance, indicated that after a certain number of ranges were installed, it made increasingly smaller difference in the load demand as additional ranges were added.

Such testing indicated that a feeder supplying, say, one hundred 12-kw ranges would not be likely to be subjected to more than a total of 100 kw at any one time, whereas a simple multiplication by 100 of the 8 kw required for a single 12-kw range would result in 800 kw instead of the 100 indicated as necessary by the tests.

If the full 12 kw were used for each range instead of the allowable 8 kw, and this figure of 12 kw were multiplied by the 100 ranges, the result would be 1200 kw. Notice that 1200 kw is the actual connected load but not likely to be "the actual load served." If it were, it is questionable whether there would be enough power houses in existence to supply all of the ranges now connected in the United States.

Yet, there are instances where allowable demand factors, though applicable and safe in the average installation, prove to be too severe and therefore unsuitable and unsafe. In such instances, the feeders must be increased to accommodate the actual load served. The Code specifically cautions against applying demand factors which are designed for minimum load conditions to every case indiscriminately, regardless of special conditions. (*Note carefully that demand factors are not to be applied to branch circuits.*)

Voltage drop on feeders

Many controversial remarks have been made about the Code voltage-drop recommendation on feeders. Some inspectors feel that this should be a definite requirement without exception instead of a recommendation.

Experienced contractors and engineers often feel that the existing recommendation is preferred to a definite requirement, but that the recommendation itself is too strict in that a higher percentage drop is perfectly satisfactory in many cases.

Some field men believe that 3% drop for power is satisfactory but that 1% for lighting or combined loads is ridiculous. Very little squabbling has been done about the 3% drop for heating, however. Possibly this is because it is so evident how rapidly heating efficiency drops in proportion to voltage drop.

These voltage drop percentages should not be exceeded to any great extent in such cases where reasonable precaution can be taken to avoid excessive drop. However, this is a recommendation rather than a requirement for the simple reason that in some rare cases no reasonable increase in copper would effectively lower the drop.

The induction, alone, in some long heavy runs would prevent attaining desired voltages at the terminal ends, even though the copper cross sectional area is more than ample. In such cases, even doubling the amount of the copper would still not reduce the drop appreciably.

It is under such a condition where an increase in drop would be permissible, provided that this additional drop would not be great enough to result in dangerous heating from such factors as motor overloads and motor burnouts. Where this danger is likely to result, and nothing can be accomplished by copper increase, the system should be redesigned in such a manner as to limit the length of low voltage, heavy current runs.

Neutral computations

Neutral sizes are not difficult to compute in accordance with Code requirements, although some engineers are prone to simply specify neutral copper to be 50% of phase copper sizes. This usually turns out to be ample and probably is as satisfactory as any "rule of thumb" method.

The first thing to do in computing the neutral size in compliance with Code requirements is to determine the total load after demand factors, if any, have been applied. From this total, deduct all of the 3-phase and single-phase loads which have no neutral connection, such as 220-volt single-phase motors and 3-phase motors on a 120/240 volt system, as an example.

The maximum remaining load between any one phase and the neutral is the possible load or "unbalance" which the neutral may have to carry. The neutral conductor is required to be of sufficient capacity to safely carry this unbalance.

Three exceptions

There are three exceptions that must be given consideration.

(1) For the now rare 5-wire 2-phase systems, this amount of unbalance, when not exceeding 200 amperes, must be multiplied by 140% so that, as an example, on an unbalance of 100 amperes, the neutral must be capable of carrying 140 amperes.

(2) Range neutrals need not be capable of carrying more than 70% of the total amount computed for each phase conductor after applying the demand factors permitted by Table 29 to the phase conductors, so that, for instance, if the phase conductor must be large enough to carry 100 amperes, the neutral must be capable of carrying 70 amperes.

(3) On any neutral where the unbalance exceeds 200 amperes, a 70% demand factor may be applied to that portion above 200 amperes, so that a total unbalance of, say, 600 amperes would require a neutral capable of carrying 200 amperes at 100% plus 400 amperes at 70%, or a total of 480 amperes.

There are two exceptions to the last exception, or to put it more plainly, there are two specified instances when the 70% demand factor is not permitted to be applied to any portion of the unbalanced load.

These are (1) when 50% or more of the load consists of electric discharge lamp ballasts, and (2) when only two phases and a neutral of a 3-phase, 4-wire, wye-connected system are used. In (1) just above, the neutral must be the same size as the phase conductors. In (2) just above the neutral must be cap-

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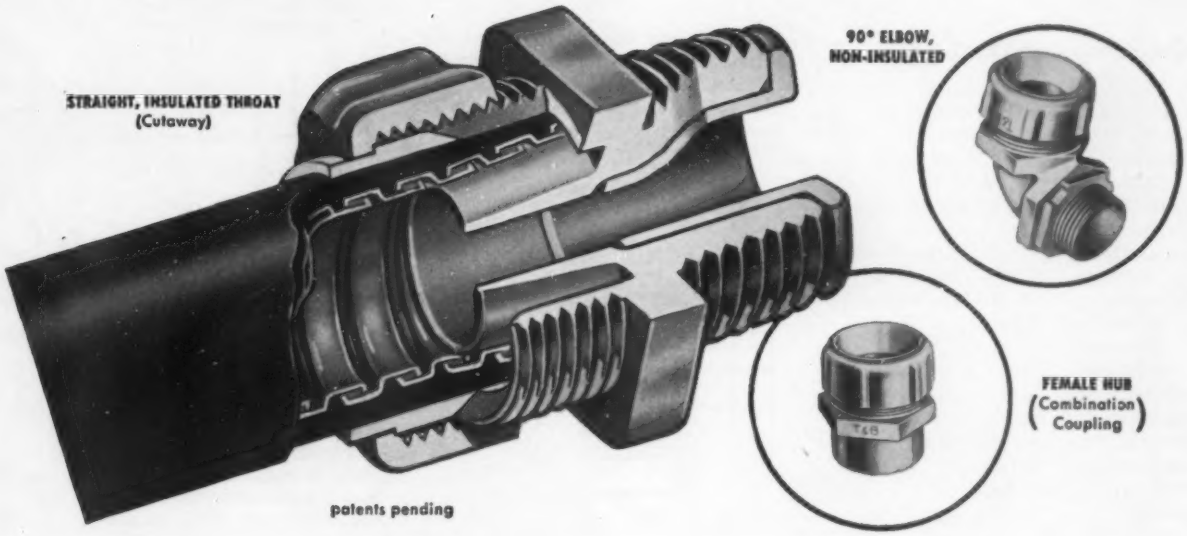

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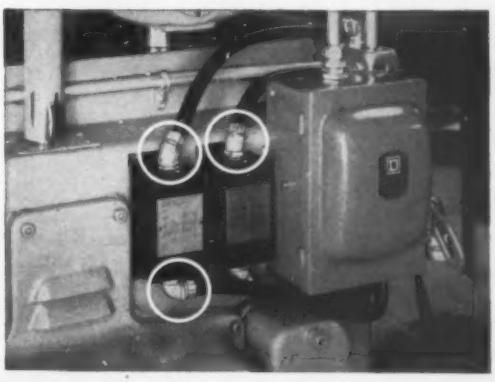

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able of carrying the total unbalance after deducting any loads not connected to the neutral, such as single-phase 208 volt motors on 120/208 volt system.

Answers to the Code test questions are as follows: (1. **F** section 2201) (2. **T** sec 2201) (3. **T** sec 2201) (4. **F** sec 2202) (5. **F** sec 2203-b) (6. **a** sec 2203-c) (7. **c** sec 2203-d) (8. **b** sec 2203-e) (9. **b** sec 2203-e) (10. **c** sec 2204).

Questions on the Code

We have three closely related questions this month which we will group together, answer separately, and then attempt to explain.

QUESTION 1: Could two single pole breakers which are connected to the same phase be equipped with a handle tie so that it would count as only one disconnecting means in order to hold the total number of disconnects to six?

ANSWER: No.

QUESTION 2: Is it permissible to connect two single pole breakers together with handle ties as a multi-wire circuit when each has its own separate neutral if the breakers are connected to opposite phases?

ANSWER: No.

QUESTION 3: May I use three single pole breakers connected with handle ties as a service disconnect for a 3-phase motor?

ANSWER: No.

EXPLANATION 1: Section 2351-a limits the number of service disconnecting means to six switches or circuit breakers. This section does permit the use of handle ties to combine two or three such single pole switches or breakers provided that they are installed on multi-wire circuits with one pole for each ungrounded conductor. It does not permit them to be combined under any other condition. Under no condition would it permit the practice of combining two such breakers when both are connected to the same phase, as shown in Figure 1.

EXPLANATION 2: Section 2111 defines a multi-wire circuit as "a circuit consisting of two or more ungrounded conductors having a potential difference between them, and an identified grounded conductor having equal potential difference between it and each ungrounded conductor of the circuit and which is connected to the neutral conductor of the system." The question indicates that two 2-wire circuits are contemplated

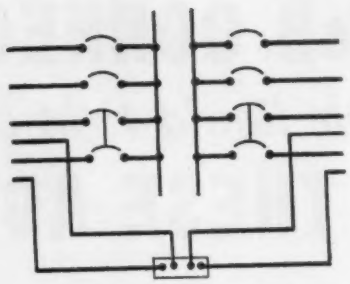


Fig. 1—Code does not permit the tying together of circuit breaker handles in order to reduce the number of disconnecting means to the required six.

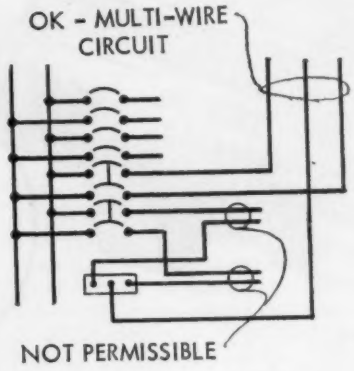


Fig. 2—Circuit breaker handles may be tied together when the separate units serve a multi-wire circuit, as shown in the upper portion of this diagram. The handle tie is not permitted for two two-wire circuits as shown in lower part of diagram.

rather than one 3-wire, or multi-wire, circuit. The latter, of course, would have only one neutral conductor common to all phase conductors. Two such 2-wire circuits could be unrelated in regards to their respective loads, while the proper function of a multi-wire circuit is to serve one integrated branch circuit load in such a manner as to insure to a reasonable degree a proper balancing of the load between each of the phases. Strict adherence to this rule will avoid confusion. Laxness toward it by permitting two 2-wire circuits to be regarded as one multi-wire circuit will enevitably lead to abuse. See Figure 2.

EXPLANATION 3: Single pole breakers are not approved for 3-phase service. Single pole breakers which have been rated at 120/240 volts are not suitable for use on circuits of over 120 volts to

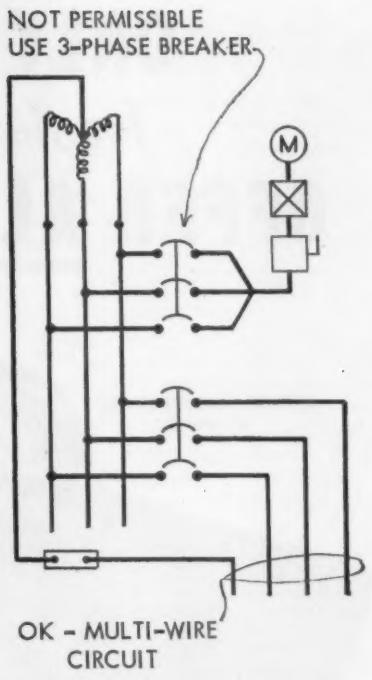


Fig. 3—Handles of three single-pole circuit breakers may be tied together when they serve a multi-wire circuit. However, three such single-pole circuit breakers are not approved for three-phase service.

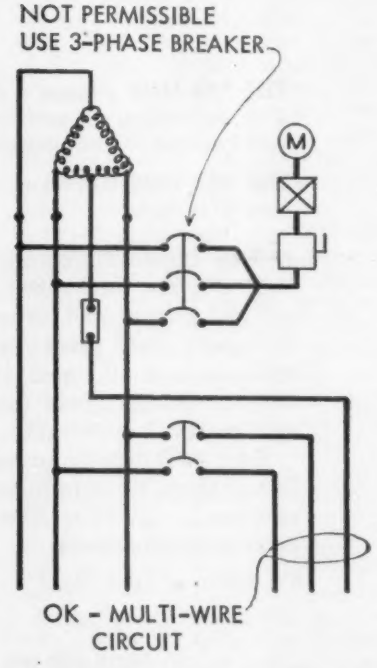
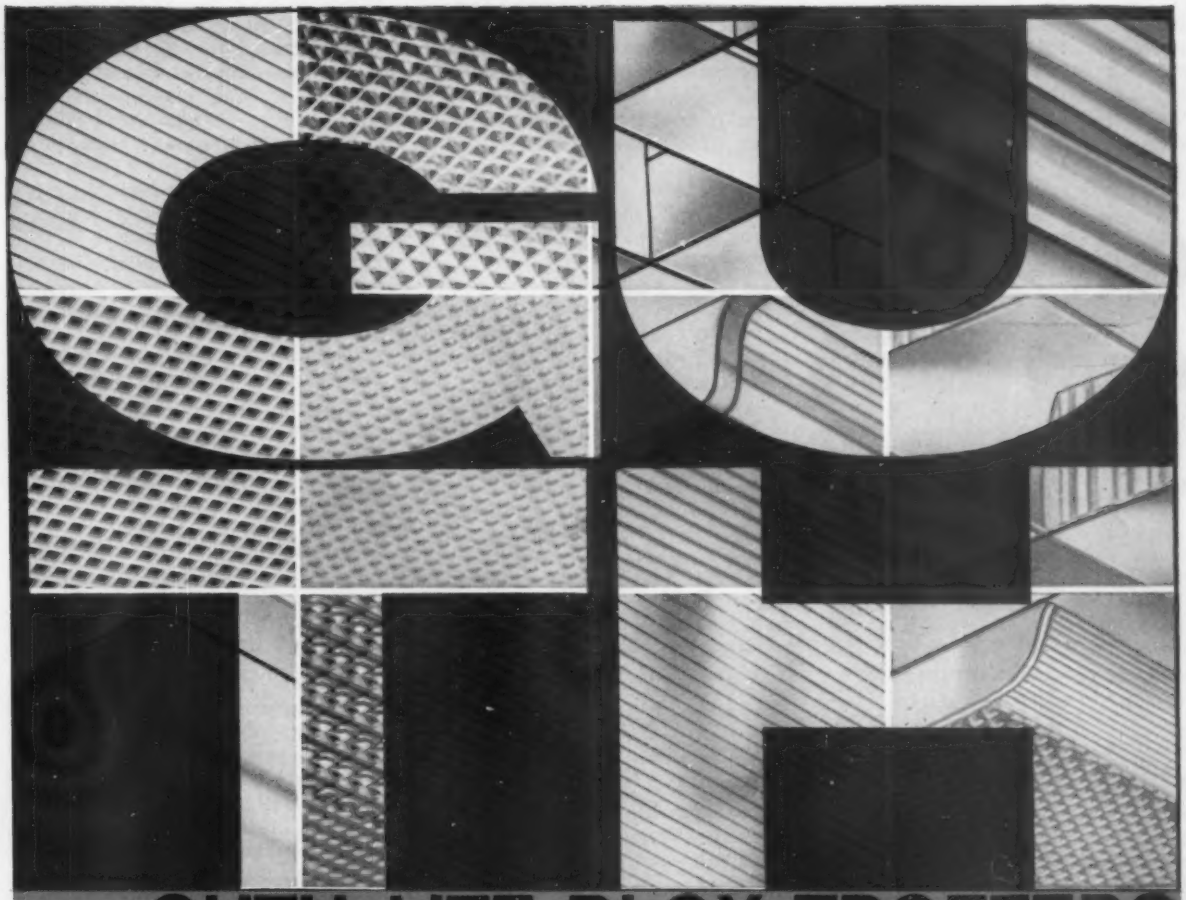


Fig. 4—This is another variation of the situation described in Fig. 3. Single-phase circuit breakers with handles tied together may be used for a multi-wire circuit but not for a three-phase motor circuit.



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ground. Delta-connected, 3-phase, 4-wire 120/240 volt systems having the midpoint of one phase grounded have a voltage to ground on the "high leg" of 208 volts. Furthermore, section 2353 requires the disconnecting means to "simultaneously disconnect all ungrounded conductors, except for 3-wire direct-current or single-phase circuits or multi-wire lighting circuits." See Figures 3 and 4.

Code interpretations clarify wiring rules

◆ A SERIES of five official interpretations of the 1956 National Electrical Code have been released by the National Fire Protection Association, it was announced recently by the National Electrical Code Committee of NFPA. These interpretations, developed through the established committee procedure in response to requests, have been reviewed and released by the NFPA Electrical Correlating Committee.

Subjects covered by the interpretations include clearance of service drops, installation of electrical metallic tubing in concrete, panelboard protection, current limiting devices and single-pole circuit breakers as disconnecting means. The official text follows.

Interpretation No. 443

Article 230; *Clearance of service drops.*

Question No. 1—Does the retaining of the words "in general" at the beginning of Section 2324 of the 1956 National Electrical Code and the revision in the wording of the last sentence still permit a point of attachment of less than ten (10) feet?

Answer—No.

Question No. 2—Is it the intent of the last sentence in Section 2324 of the National Electrical Code to permit a reduction in the clearance over residential driveways only from eighteen (18) feet to twelve (12) feet with a maintaining of the eighteen (18) feet over alleys and public roads and ten (10) feet over sidewalks where it is impracticable to attach to a point sufficiently high to obtain the eighteen (18) feet over residential driveways?

Answer—Yes.

Interpretation No. 444

Section 3482; *installation of EMT in concrete.*

Question—If ½" or ¾" electrical metallic tubing is installed in the center of a 4" slab of non-cinder concrete in direct contact with the earth, with sand and gravel fill, would this be prohibited by Item 2 in Section 3482 of the 1956 Code?

Answer—No.

Interpretation No. 445

Section 3883; *panelboard protection.*

Question—Does paragraph a of Section 3883 apply to a 200 ampere circuit breaker lighting and appliance branch circuit panelboard installed in a dead-front switchboard section with a 400 ampere service switch and fuse providing the only overcurrent protection ahead of it, where both the panelboard and the dead-front switchboard, in which it is incorporated, have been inspected and labeled by a laboratory of recognized standing prior to shipment from the factory?

Answer—No.

Interpretation No. 446

Section 1109; *current limiting devices.*

Statement—A 3-phase, 120/208 volt, 4-wire, grounded wye system is being used to supply an auditorium. The anticipated short circuit current is above the 10,000 ampere maximum for which standard National Electrical Code fuses and branch-circuit and service-circuit breakers are normally tested.

Question—Is it the intent of Section 1109 of the 1956 edition of the National Electrical Code that all overcurrent devices in such a system be capable of interrupting safely the maximum short-circuit current which can occur at the point in the system where the particular overcurrent protective device is located?

Answer—Yes, but this might be achieved by the provision of current limiting devices ahead of the conventional branch circuit protection and would not necessarily require that the branch circuit protective device have current interrupting capacities in excess of the values for which they are normally tested.

Interpretation No. 448

Section 2351; *single-pole circuit breakers as disconnecting means.*

Question—Is it the intent of Section 2351 to recognize as one of the six disconnecting means, two single-pole circuit breakers on the same side of the line and controlling two two-wire circuits?

Answer—No.

Utility conference on space heating

(Continued from page 60)

tems when compared with fuel-fired systems. Hidden costs of fuel-fired systems, like higher installation costs, cost of operating fans and value of space when amortized over the life of the heating system are equivalent to an estimated $86.00 per year on an average, Mr. Aronson has calculated.

Reporting systems should be clear, concise and complete, R. M. Wood, of Ebasco said. Good records are important as a source of data for studying the value of heating loads to the utility, as material for visualizers and other sales promotion pieces, for evaluating methods used to compute heating requirements, and in evaluating the reliability of equipment in service.

New product disclosed

The school closed with a presentation of something new in electric heating—Lamitherm. This is a completely new heating device made from impregnated paper which can be produced in quantity and in many shapes and sizes. Sheets can be fastened to standard-sized plaster board, molded into cylinders, or built up like papier mache into baseboards or corner moldings. Every square inch of the paper formed this way is a heater. R. Smith Johannsen, president of Chemelex Incorporated, producer of Lamitherm, demonstrated the versatility of the product and explained many possible applications.

News of the industry

edited for Southern readers

Lighting Institute plans local chapters

PLANS TO ORGANIZE local lighting chapters to promote Live Better Electrically's Medallion Home Program and help develop the Academy of Lighting Arts were recently announced by the American Home Lighting Institute.

Details were revealed at the first national residential lighting conference sponsored by the institute at Nela Park, Cleveland. Fifty of the nation's leading fixture manufacturers and distributors attended.

"We hope to activate chapters in the 25 states and two Canadian provinces where our 106 distributor members are located," Ted Cox, managing director, said.

An organization guidebook has been prepared by AHLI, telling local groups how to organize and how to tie in with the Medallion Homes and the Academy of Lighting Arts.

"Since the Medallion Home program was announced in January," Cox said, "the number of homes expected to qualify for the bronze medallion has gone up to 100,000 from the initial 20,000.

"This welcome increase is due to greater participation by public utilities than was expected. It will give every institute member that much more of a chance to increase sales and profits in 1958. But local organization will be required."

Key distributors are being urged by AHLI to take leadership in organizing local chapters. Manufacturer sales representatives are being encouraged by their factories to assist distributors in grassroots activity.

Installed capacitor kilovars increased

THE NUMBER of installed capacitor kilovars in the United States increased from 40,500,000 to 45,000,000 during 1957, according to W. G. Hart, manager of power capacitor sales for General Electric's Capacitor Dept.

The ratio of installed capacitor kilovars to peak load kilowatts was 0.38 at the end of 1957. Hart predicted that the ratio would reach 50 per cent by 1967.

Though there was a slow-down in the rate of installing capacitors in the second half of 1957, the general trend of utilities to push system power factors toward unity continues at an accelerated rate, Hart said. He pointed out that "the low cost of capacitors compared to other system investment provides utilities with a compelling reason for going to system power factors approaching unity at the time of peak load. No other product purchased by utilities offers comparable cost reducing opportunities," he said.

Nomination of L. F. Hickernell to be 1958-59 president of the American Institute of Electrical Engineers was announced during the five-day AIEE Winter General Meeting. Mr. Hickernell is engineering vice-president at Anaconda Wire and Cable Co.

Retiring President Sam Crain, extreme right, of the Panhandle Chapter, NECA, transfers official papers to incoming President George E. Broome. Tom Brooks, left, owner of Brooks Electric Co., in Pampa, Texas, and Elmo Duke, second from right, member of the NECA Board of Governors witness the transaction at a recent meeting in Amarillo.

Panhandle NECA names 1958 officers

GEORGE E. BROOME, owner of the Broome Electric Construction Co., of Amarillo, was elected at a recent meeting to head up the Panhandle Chapter of NECA during 1958. Mr. Broome succeeds outgoing president Sam Crain, also of Amarillo.

The chapter serves parts of Oklahoma and New Mexico as well as the Panhandle section of Texas.

Other new officers are C. S. Williams, Jr., first vice-president, Clarendon Electric Company, Clarendon, Texas; Earl Potter, treasurer, Amarillo Electric Co.;

and Elmo Duke, Duke Electric Co., Amarillo, member of the NECA board of governors.

Local directors of the group will include Robert E. "Bob" Burns, Davis Electric Company in Pampa; Fred P. Brien, Brien Electric Co., and J. C. Wilson, Wilson Electrical Service Center, both of Amarillo.

AIEE pulp and paper industry meeting held

ELECTRICAL engineering aspects of the pulp and paper industry were discussed at a two-day conference in Raleigh, N. C., March 27-28, sponsored by the American Institute of Electrical Engineers.

At this meeting, one in a series sponsored by AIEE, eight papers were presented by leaders in the electrical industry:

Coordination of Protective Relays in a Paper Mill, by W. W. Pruitt, J. E. Sirrine Co., Greenville, S. C.; Factors Involved in Selection and Purchase of Electrical Apparatus, by H. B. Whitworth, The Champion Paper & Fibre Co., Canton, N. C.; Cypak Control of Rapid Cycle Digesters, by W. A. Roth, Westinghouse Electric Corp., Buffalo, N. Y.; Static Switching Control of Rapid Cycle Digesters, by G. J. Hess, General Electric Co., Roanoke, Va.

Evaluation of Three Wiring Systems Applied to the Pulp and Paper Industry, by J. F. Steedley, Bowaters Research and Development, Inc., Calhoun, Tenn.; A-C Systems for Precision Measurement of Machine Speed and Section Draw, by G. M. Butler, Curtis-Wright Corp., Carlstadt, N. J.; D-C Systems for Precision Measurement of Machine Speed and Section Draw, by W. Mikelson, General Electric Co., Schenectady, N. Y.; Material Handling System with Electronic Memory for Dispatching, by H. Stephenson, Jervis B. Webb Co., Atlanta, Ga.

Middle Eastern AIEE to meet in Washington

PROBLEMS in outer space, electrical developments in medicine, the latest discoveries in nuclear energy, television and electronics are among the subjects to be studied at the Middle Eastern District Meeting of the American Institute of Electrical Engineers at the Sheraton Park Hotel, Washington, D. C., April 28-30, it has been announced by C. H. Giroux, general chairman.

Principal speaker at the opening general session will be Dr. Lloyd V. Berkner, president, member of the Board, and chairman, of the Executive Committee of Associated Universities, Inc., New York. Topic of his address is "The International Geophysical Year and Instrumented Earth Satellite." Dr. Berkner is a Fellow of AIEE, a member of many other scientific societies, unions and academies and has been a prime mover in IGY.

Twenty-seven sessions and symposiums are planned, at which more than 100 technical papers will be presented. The sessions will deal with developments and discoveries in the fields of communication, transmission and substations, instrumentation, naval testing, nuclear engineering, automation, weapons development, management, safety, electrothermal progress, electronics, electricity and medicine.

An exhibition of interest to electrical engineers also is planned in the exhibition hall of the Hotel.

Five inspection trips are scheduled to the National Bureau of Standards, the Naval Ordnance Laboratory at White Oak, Md., the Army Package Power Reactor at Fort Belvoir, Va., the new WRCA-TV transmitter and the David Taylor Model Basin at Carderock, Md.

Gray heads Tampa electrical contractors

NEW OFFICERS of the Tampa Electrical Contractors Association were elected at a recent dinner meeting. They are: Malger Gray, president, Fluorescent Service, Inc.; Wallace Carruthers, vice-president, City Electric Co.; Burnette Sheppard, secretary-treasurer, Sheppard Electric Co.; and

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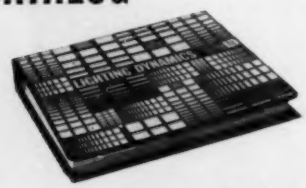

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Loyd B. Chappell of Electrical South

LOYD B. CHAPPELL, of Loyd B. Chappell & Associates, died at his home in Beverly Hills, California, March 14th after a short illness. Loyd and his organization have represented ELECTRICAL SOUTH and the other W. R. C. Smith publications on the West Coast since 1924.

He had a host of friends in advertising and marketing circles who will be saddened by his passing.

His conscientious and loyal efforts have been an important factor in building an appreciation of Southern markets among manufacturers and advertising agencies in the Western territory. He contributed substantially to the success and progress of the Smith publications.

For the more than thirty-three years that Loyd was our associate and friend, we are profoundly grateful.

W. J. Rooke
Chairman of Board
W. R. C. Smith Publishing Co.

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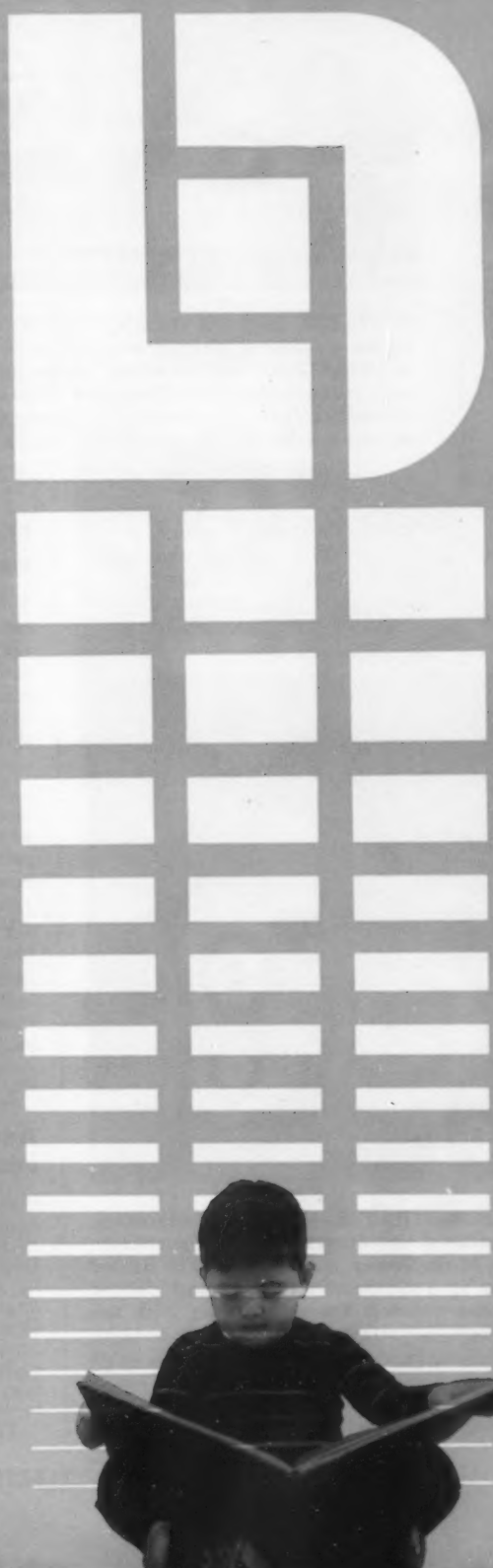

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Richard Williers, state board member, Williers Electric Co.

The group voted to seek more energetic activity of the City Electric Inspection Code. Speakers at the meeting pointed out how adequate wiring and up-to-date installation of equipment effect insurance rates and general safety.

AIECA membership expansion revealed

AT THE LAST MEETING of the board of directors of the Associated Independent Electrical Contractors of America, it was voted upon to accept active membership of individual electrical contractors. It was stressed however, that the objective was to encourage and assist individual members to form a recognized group within his city so as to have directorship representation.

Membership for the Travis County Electrical Contractors Association of Austin, Texas was approved and many new inquiries for membership were reviewed.

Any representative of an association or individual electrical contractor not affiliated with a similar national association may qualify for membership. Interested parties may contact the Executive Office, P. O. Box 4915, Dallas, Texas.

SUPPLIER BUILDS ILLUMINATING SHOWCASE—Construction has begun on Rogers Electric Supply Company's new $200,000 headquarters in Dallas, Tex. The two-story "showcase" type of glass and brick structure will display over a thousand different illumination units, as well as numerous types of commercial lighting fixtures and luminous ceilings within a 6,000 sq. ft. area of the 15,000 sq. ft. of operating space.

EMERGENCY POWER UNIT DEMONSTRATED—Consulting engineers, utility engineers, electrical contractors, and others had an opportunity, recently, to see demonstrations of Micro Power, a new product of United States Motors Corp., which serves as a source of uninterrupted electric power for emergency use. Company officials are shown here with the equipment just before a series of demonstrations in Atlanta. Left to right are T. J. McGuire, Midwest District manager; Edward W. Zipprich, sales manager; and Norman Parke, district sales representative with headquarters in Atlanta. The Micro Power standby unit will pick up load without a break—even before voltage drops below usable level.

Electrical contractors meet to discuss light

MAINTENANCE of lighting systems and the possibilities it holds for profitable service sales by electrical contractors will be the principal subject of a conference held this month at the General Electric Lamp Division headquarters.

The latest developments in lamps and lighting will be demonstrated to the electrical contractors gathering at Nela Park in Cleveland. Special attention will be given to the new horizons in lighting which have been made possible with the development of high powered fluorescent lamps operating on high-frequency power systems. The vital role of the electrical contractor will be emphasized.

Anchor Metals awards annual scholarship

A FOUR-YEAR COLLEGE scholarship in engineering will be awarded to a senior student at Lawrence Bell High School at Hurst, Texas, by Anchor Metals, Inc. of Hurst, beginning this year, Anchor Metals President Clyde F. Mooney has announced. Anchor Metals is engaged in the design and fabrication of steel electrical transmission towers and switchyard structures.

The scholarship, worth $2,900,

will be awarded each year to a student of good standing who has had four years of mathematics and four of science and who has shown aptitude in those subjects, Mr. Mooney stated.

The winner may attend any college in the United States that offers an accredited four-year course leading to a bachelor's degree in engineering. He will be expected to work at Anchor Metals for practical experience during vacations from college. Following graduation, the winner will be encouraged to work full time for the company.

Industry unprepared for automation

AMERICAN INDUSTRY will have to produce 40 per cent more goods by 1962, but so far it is unprepared in basic facilities to do this, a spokesman for the electrical industry has warned.

Tomlinson Fort, vice-president in charge of Westinghouse Electric Corporation's apparatus division, told representatives of electric utilities and electrical equipment manufacturers that electromation —a word coined to show that electrical energy is necessary to power automation—"is not a luxury any more. Rather it is a basic tool of business and production."

Mr. Fort spoke at the third National Industrial Electric Heating Conference, sponsored by the Industrial Electrification Council. The three-day conference is being held at the Netherland Hotel.

"The demand for goods is bound to increase by 40 per cent in the next five years while the labor force will increase only 13 per cent," Mr. Fort said. "Electromation is here to stay. It's no longer a question of whether or not to get aboard, but how much and how soon."

Mr. Fort referred to results of a recent survey of 550 leading industrial plants in the country to determine how well prepared they were for the increased use of electricity necessary for continuous processing and automatic handling where built-in, self-regulating devices speed production and improve quality.

"All 550 plants have complete engineering staffs devoting full time to such things as electrical facilities, but not one plant had adequate main transformer capacity for the loads needed for a 10 year growth," the Westinghouse vice-president said. "These are plants of major importance—many of them are quite new. If that's the situation of these major plants, what is it like in the medium and small ones?

"To say that American industry

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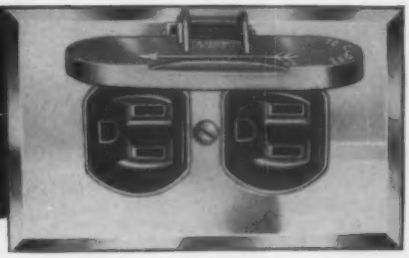

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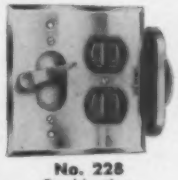

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is underpowered today is an understatement. What good are all these dreams of electromation and increased output per worker if the very energy that is going to make this possible can't even get in the front door?"

From 1936 to 1956, the labor output needed to produce a ton of finished steel was reduced from 29 man hours to 15 man hours through the use of electrical "helpers," Mr. Fort pointed out. During that same period, the production speeds of cold reduction tin plate strip increased six times.

"Here is a good place to comment on the over-all economics of electromation," he said. "During this same period, employment actually increased by 37 per cent. More workers earned more money to buy more products. The per capita use of steel doubled, bringing on a higher standard of living for the American worker and more employment in safer, pleasanter and more rewarding jobs."

When man built himself a machine so precise and complex that he could not regulate every component needing regulation, he designed an intelligence system along the lines of his own brain and put this into the machine to do the job, the Westinghouse official declared. But this new technology brings management many new problems. Among them:

How to determine the economic justification for electromatic production.

How to redesign the product so it can be manufactured this way.

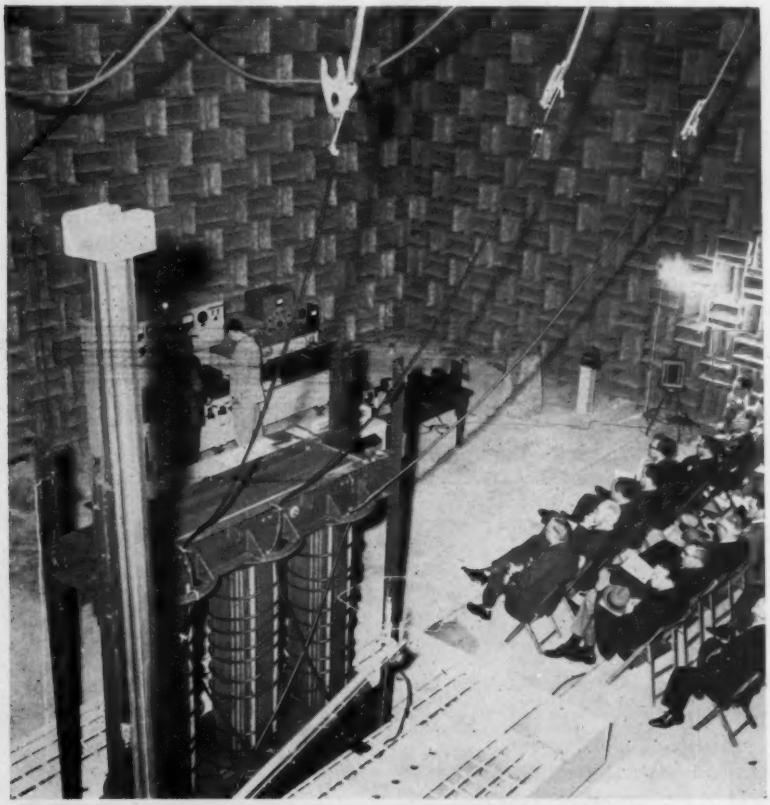
How to up-grade semi-skilled wage earners to highly skilled technicians.

How to pay for all this and still realize a profit during the life expectancy of the equipment.

"The solutions to these problems call for a kind of teamwork and a kind of man heretofore unknown in any industrial system," Mr. Fort said.

There is nothing radically new about electromation, he added. As early as 1900, every industrial worker had an average of nine electrical "helpers"—the equivalent of two horsepower to aid him in his work. By 1957, this had increased to 61 "helpers" totaling 13.5 horsepower.

The fact that each working man today has 21,500 kilowatt hours of electrical energy at his disposal annually may be impressive, Mr. Fort said, but it is not going to be enough to enable the worker to support himself in the manner to which he has become accustomed. He needs much more electrical energy for better machines to handle his tiresome, fatiguing and sometimes dangerous routine chores.



Utility and industrial officials view a special demonstration during the dedication of Pennsylvania Transformer's Acoustical Research Laboratory. The transformer core in the foreground was used to illustrate how transformer noises will be studied in the ultra-quiet laboratory.

Acoustical research laboratory dedicated

THE MILLION-DOLLAR Thomas A. Edison Acoustical Research Laboratory at Pennsylvania Transformer Division, McGraw-Edison Co., which is located on a seven-acre site adjacent to the Canonsburg, Pa., plant was recently dedicated, providing complete facilities for research on means to reduce noise created by electrical equipment.

Transformer noise was not considered a problem until the last few years. The increased use of electricity, coupled with rapid development of most residential areas, has caused larger transformers than ever before to be located near homes. With its new fully-equipped laboratory, Pennsylvania Transformer will be able to accelerate a noise-reduction program that already has resulted in considerable improvement in this field.

Arnold Horelick, engineering manager, explained at dedication ceremonies that the huge anechoic chamber of the acoustical laboratory will provide a constant quietness of a lower level than most human beings have ever experienced. Complete analyses will be made of the noise created by transformers even larger than 100,000 kva.

Electronic brain computes for lighting

LIGHTING DYNAMICS (formerly Ruby Lighting), a new subsidiary of Ekco Products Co., is computing the coefficients of utilization for its fluorescent fixtures on an electronic "Magic Brain" computer. The results are accurate to five decimal places—a degree of accuracy hitherto unobtainable.

All coefficients are based on the interflectance method. Older IES systems took into account one reflectance bounce only—from wall, ceiling and floor. The society's interflectance method, while being more accurate, involves infinite series and other complex calcula-

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potential transformer . . .

92 through 230 KV . . .

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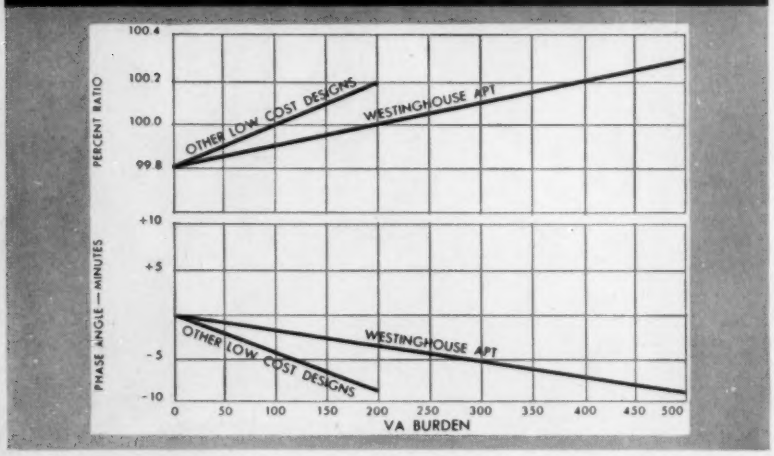

Westinghouse APT transformers meet ASA 0.3 accuracy standards through 500 volt-amperes burden at the price you'd pay for a competitive unit with 0.3 accuracy through only 200 va . . . Here's extra capacity for future load growth —without extra cost.

Thermal rating . . . 6500-va minimum for 115-kv APT compares with only 4000 va for other low-cost designs.

The Westinghouse APT is not a cascade design. It is a modification of conventional Westinghouse OPT designs, utilizing a solid insulation principle made possible by advanced knowledge of insulation application. Result: an equivalent-priced but less complex (single core and coil) design than the cascade-type construction.

Single-piece porcelain and welded tank construction reduces possibilities of gasket leaks.

Call your Westinghouse representative for the full performance story on the APT transformer—another example of Westinghouse leadership in transformer design, made possible by Plowback of Earnings into research and development.

J-70866

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tions. Whereas it took thirty minutes to compute a block of coefficients according to the early system, the interflectance calculations consume eight hours, using an office calculator and operator.

Faced with this problem, Lighting Dynamics spent fifty hours coding its problem on tape for the electronic brain. The tape contained all instructions and constants with alternative opportunities of calculating incandescent, mercury and fluorescent figures. After feeding this information into the computer, it was found that a complete set of calculations could be delivered in only ten minutes as compared to the previous requirement of eight hours. It also provided a much greater degree of accuracy.

The new Lighting Dynamics catalog may be obtained by writing to Lighting Dynamics, Inc., 802 West Whittier Blvd., Whittier, Calif., or Lighting Dynamics (Texas) Inc., 8700 Ambassador Row, Dallas, Texas.

Allis-Chalmers opens Abilene sales office

ESTABLISHMENT of a sales office at 412 First National Bank Building, Abilene, Texas, with James C. Barnett as resident representative, has been announced by Allis-

James C. Barnett

Chalmers Industries Group. Mr. Barnett had been a sales representative in Allis-Chalmers Dallas district office.

Joining Allis-Chalmers in 1951, Mr. Barnett was assigned to the Boston Works the following year as an assistant engineer after completing the firm's training course for graduate engineers. In 1954, he became assistant to the production engineer at Boston Works and a year later plant engineer there. Mr. Barnett is an electrical engineering graduate of Texas A & M.

Manufacturers appoint new representatives

J. H. HOLAN Corporation of Georgia has added two new representatives to handle sales of service and line bodies and power

Rex Mansfield

equipment. Donald "Rex" Mansfield will sell for Holan in North Carolina, South Carolina and Virginia. In Florida, Alabama and Mississippi, Holan will be represented by Thomas F. Savage, Jr.

Tom F. Savage, Jr.

* * *

R T & E CORPORATION recently appointed H. J. Clark to represent them in the state of Alabama.

* * *

GENERAL ELECTRIC Company's Insulator Department has appointed Louis M. Brock as district manager for areas including Kansas and western Missouri. Mr. Brock will headquarter in Kansas City, Mo.

* * *

R. A. MANNING Co., Inc., has announced that Chassaing Brothers Lighting will act as their agents in the St. Louis territory, representing their line of traditional and contemporary lighting equipment for churches and institutional buildings.

R. A. McDuffie

KAISER ALUMINUM & Chemical Sales, Inc., has named R. A. McDuffie as electrical conductor sales supervisor in the Atlanta district, according to G. N. Houck, general sales manager.

* * *

ALLIS - CHALMERS Industries Group recently selected Fred H. Young as sales representative in the Atlanta area. The company also announced the appointment of John E. Garrett as sales representative in the Jacksonville office.

* * *

SIERRA ELECTRIC Corporation's wiring device and wall plate line will be sold in Alabama and

Frank W. Pearson

Georgia by Frank W. Pearson, who will headquarter and maintain warehouse facilities in Albany.

* * *

A. H. MASSEY, Inc., of Derby, Conn., has named Bill Crichton to represent their line of electrical devices in the state of Florida. Massey is the manufacturer of Pierceway plastic duct wiring systems of multiple outlet components for home and industry.

* * *

S & M LAMP Company recently announced the appointment of Ross D. Thomas as factory representive for the company's line of

Westinghouse
type APT
potential
transformer

SAVES 40% ORIGINAL COST OVER CONVENTIONAL DESIGNS

The Westinghouse Type APT potential transformer is designed for low-cost positive protection and greatest metering accuracy. Its design—single-core-and-coil and single-bushing—provides a saving in original cost over conventional design units . . . without sacrificing either accuracy or protection.

The APT meets all ASA standards for high-voltage metering and relaying applications . . . it's the Westinghouse answer to your demands for *high* accuracy at a *low* cost.

J-70865

YOU CAN BE SURE...IF IT'S Westinghouse

floodlighting equipment in western Tennessee and northern Mississippi. Mr. Thomas will headquarter in Memphis.

* * *

AMPERE INDUSTRIES, of Newark, New Jersey, recently appointed Robert C. Ramsey to represent their line of radiant heating equipment and lighting fixtures in Oklahoma City, Okla. Harold Sudekum was named to serve the Dallas, Texas area.

* * *

JOHN C. VIRDEN Company has appointed Ned P. Walters as sales representative in Alabama, Georgia, and Pensacola, Florida, for the company's line of lighting equipment.

Ned P. Walters

NEW CATALOG SPARKS INTEREST—Subject of interest is Murray Manufacturing Company's new "MP" fully magnetic, plug-in type circuit breaker which was introduced recently at the company's national sales convention in New York. District Sales Manager Frank Hill reviews the 1958 catalog with Southern Representatives. From left to right, Lew Crews, Richmond; Bob Griffin, Atlanta; Johnny Collins, Tampa; Edgar Jones, New Orleans; Frank Hill; Al Barnes, Miami; John Townes, Nashville; John Griffin, Atlanta; and Al Hilton, Charlotte.

ALLIS-CHALMERS has named the McDonald Electric Co., Inc., 367 Northwest 6th St., Miami, as distributor for A-C transformers in Dade and Monroe counties in Florida.

* * *

SIERRA Electric Corporation has named L. P. Chick and Company to represent their line of wiring devices and wall plates in Kentucky and Tennessee.

L. P. Chick

* * *

TITAN SALES Corporation has announced the appointment of Fain Associates, Inc., 3201 Oak Lane, Dallas, to sell their line of electric space heaters in Arkansas, Texas, Louisiana, Mississippi and Oklahoma.

* * *

S. H. COUCH Co., Inc., North Quincy, Mass., manufacturers of signaling equipment has appointed Glenn H. Arnold as representative for Alabama, Georgia, and eastern Tennessee.

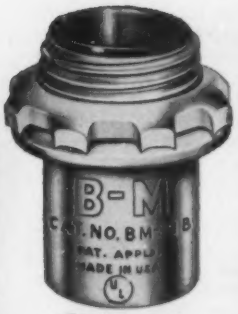
* * *

STANDARD TRANSFORMER Co., of Warren, Ohio, will now be represented in Kansas and western

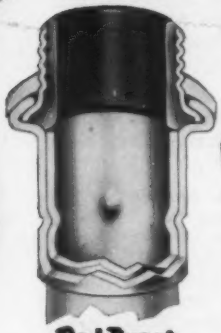
SECOVAR CAPACITORS IN FULL PRODUCTION—The first secovar capacitor to come off Sagamo Electric Company's full volume production line at Pickens, S. C., is being examined by W. G. Dorsett, plant manager, J. A. Muir, Jr., mechanical engineer, and R. R. Wylie, marketing manager. Mr. Muir is holding a Type S, 240 volt, 2 kvar secovar, which can be plugged into a meter socket to relieve var load all down the line.

B-M

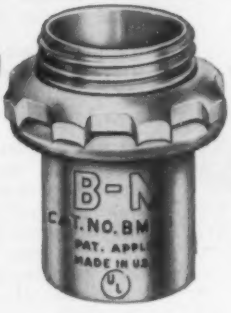
the original concrete-tight **INDENTER FITTINGS** *for E.M.T.*



Red Throat
Insulated
Connector



Red Throat
Cross section



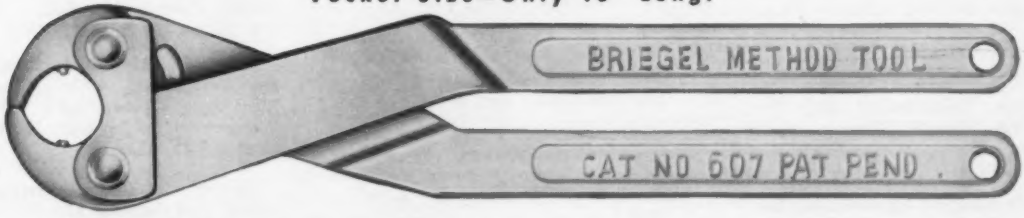
"BM" #100
Cutter for ½, ¾
and 1" E.M.T.

"BM" #1000
Holder for ½, ¾
and 1" E.M.T.

"BM" #600
Changeable Jaw Indenter

THE NEW BM607 INDENTER FOR ½" FITTINGS

Pocket Size—Only 10" Long!



Briegel Representatives from Coast to Coast

J. H. Akerman
813 Sistina Avenue
Coral Gables 46, Florida
Phone: Mohawk 7-3864

Harry C. Andrews Co.
5440 Gravois Avenue
St. Louis 16, Missouri
Phone: Hudson 1-7373

Crescent Electric Sales Co.
1800 N. Humboldt Blvd.
Chicago 47, Illinois
Phone: Albany 2-2600

R. L. Cunningham Electric Co.
843 South Front Street
Philadelphia 47, Pennsylvania
Phone: Lombard 3-3660 & 3-3109

L. J. Crews
1725 Arlington Road
Richmond 20, Virginia
Phone: 4-2273

Curtis Sales Corporation
3231 Warrenville Center Rd.
Shaker Heights 22, Ohio
Phone: Skyline 2-0225

Herbert L. Jones
745 Ohio River Blvd.
Pittsburgh 2, Pennsylvania
Phone: Linden 1-6684

Al Levin & Associates, Inc.
1200 So. Peters Street
New Orleans, Louisiana
Phone: Tulane 8480 & 8489

H. A. Maggiore & Son
15 Carleton Street
Cambridge 42, Mass.
Phone: Kirkland 7-4954

Ernst F. Hauch Co.
1282 Folsom Street
San Francisco 3, California
Phone: Hemlock 1-1828

R. C. Handy Sales Co.
4811 Excelsior Blvd.
Minneapolis, Minnesota
Phone: WAlnut 6-2939

L. D. Hood Sales
1133 West 8th Avenue
Denver, Colorado
Phone: Acoma 2-8001

A. Lee Clifford
1801 West 18th
Indianapolis 7, Indiana
Phone: Melrose 6-4449

Walter S. Nash
2101 Tula Street, N. W.
Atlanta, Georgia
Phone: Elgin 8071

Rutkin Electrical Sales Co.
935 Stanford Avenue
Los Angeles 21, California
Phone: Tucker 1224 & 5

Valkus-Kissel
1711 Kelly Street
Dallas 1, Texas
Phone: Hamilton 8-7388

W. W. Wheat & Son
2219 4th Avenue
Seattle 1, Washington
Phone: Seneca 6222

Arnold J. Young Co.
12600 Hamilton Avenue
Highland Park 3, Michigan
Phone: Townsend 9-5080 & 1

E. J. Martin Company
150 Nassau Street
New York 38, New York
Phone: Worth 4-6270

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* * *

ALLIS-CHALMERS selected the Turner Electric Works, 1020 East Eighth St., Jacksonville, Fla., as their distributor for motors, control and transformers in the northern section of Florida and the southern area of Georgia. J. M. Wright is manager at Turner, which has been an A-C certified service shop since 1946.

Brief news notes of manufacturers

PARAGON Electric Company, manufacturer of time controls for home and industry, held a series of "blast-off" meetings recently in

Dates Ahead

Illuminating Engineering Society, East Central Regional Conference, Richmond, Va., April 14-15, 1958.

Protective Relay Conference, Eleventh Annual Conference, Texas A&M College, College Station, Tex., April 14-16, 1958. Write L. M. Haupt, Conference Chairman.

Southeastern Electric Exchange, Heat Pump Steering Committee, Leisure House, Tampa Electric Co., Tampa, Fla., April 16-18, 1958.

International Association of Electrical Inspectors, Alabama Chapter Meeting, Hotel Stafford, Tuscaloosa, Ala., April 17-18, 1958.

International Association of Electrical Inspectors, Tennessee Chapter Meeting, Andrew Jackson Hotel, Nashville, Tenn., April 21-22, 1958.

Southeastern Electric Exchange, Engineering and Operation Section, Buena Vista Hotel, Biloxi, Miss., April 21-22, 1958.

Illuminating Engineering Society, South Central and Southeastern Joint Regional Conference, Hotel Lafayette, Little Rock, Ark., April 24-25, 1958.

National Electrical Contractors Assn., Third District (Southeastern) Annual Meeting, Edgewater Gulf Hotel, Biloxi, Miss., April 27-30, 1958.

International Association of Electrical Inspectors, Baton Rouge Chapter, Baton Rouge, La., April 28, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

Illuminating Engineering Society, Southwestern Regional Conference, Shreveport, La., April 28-29, 1958.

American Institute of Electrical Engineers, Middle Eastern District Meeting, Washington, D. C., April 28-30, 1958.

International Association of Electrical Inspectors, George Welman Chapter, New Orleans, La., April 29, 1958.

National Electrical Contractors Assn., Fifth District (Southwestern) Annual Meeting, Pioneer Hotel, Tucson, Arizona, April 28-May 1, 1958.

Illuminating Engineering Society, Midwestern Regional Conference, Kansas City, Mo., May 1-2, 1958.

International Association of Electrical Inspectors, Joint Meeting (Baton Rouge, George Welman, North Louisiana—East Texas, Texas Gulf Coast, and North Central Division Texas Chapters, Angelina Hotel, Lufkin, Texas, May 2-3, 1958.

American Public Power Association, Annual Meeting, Roosevelt Hotel, New Orleans, La., May 6-8, 1958.

Edison Electric Institute, Transmission and Distribution Committee, Biltmore Hotel, Los Angeles, Calif., May 8-9, 1958.

International Association of Electrical Inspectors, Florida Chapter Meeting, Cherry Plaza Hotel, Orlando, Fla., May 8-10, 1958.

National Industrial Service Association, Silver Jubilee Celebration, Hotel Roosevelt, New Orleans, La., May 11-14, 1958.

International Association of Electrical Inspectors, Virginia Chapter Meeting, Ingleside Inn, Staunton, Va., May 12-13, 1958.

Edison Electric Institute, Electrical Equipment Committee, Radisson Hotel, Minneapolis, Minn., May 12-13, 1958.

American Institute of Electrical Engineers, East Central District Meeting, Huntington, W. Va., May 13-15, 1958.

Southeastern Electric Exchange, Industrial Power Sales Conference, Edgewater Gulf Hotel, Gulfport, Miss., May 29-30, 1958.

National Telemetering Conference, (AIEE-ISA-IAS), Lord Baltimore Hotel, Baltimore, Md., June 2-4, 1958.

Public Utilities Association of the Virginias, Accident Prevention Conference, Roanoke Hotel, Roanoke, Va., June 6, 1958.

Southwest High Fidelity Distributors Association, Hi-Fi Show, Shamrock Hilton Hotel, Houston, Texas, June 6-8, 1958.

Edison Electric Institute, 26th Annual Convention, Boston, Mass., June 9-11, 1958.

National Association of Electrical Distributors, 50th Annual Convention, Civic Auditorium, San Francisco, June 9-13, 1958.

American Institute of Electrical Engineers, Summer General Meeting, Buffalo, N. Y., June 22-27, 1958.

American Institute of Electrical Engineers, Petroleum Industry Conference, Baker Hotel, Dallas, Sept. 15-17, 1958.

Public Utilities Association of the Virginias, 40th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., Sept. 18-21, 1958.

Edison Electric Institute, Meter and Service Committee, Plaza and Driscoll Hotels, Corpus Christi, Texas, Sept. 22-24, 1958.

Southeastern Electric Exchange, Engineering and Operation Section, Hotel Roanoke, Roanoke, Va., Oct. 20-21, 1958.

International Association of Electrical Inspectors, Southern Section Thirtieth Annual Meeting, McAllister Hotel, Miami, Fla., Oct. 20-22, 1958.

Power Distribution Conference, University of Texas, Austin, Tex., Oct. 20-22, 1958.

National Association of Corrosion Engineers, South Central Region Annual Conference and Exhibition, Roosevelt Hotel, New Orleans, Oct. 20-24, 1958.

National Electrical Contractors Association, Annual Convention, Dallas, Texas, Nov. 19-22, 1958.

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The 1958 ELECTRICAL SOUTH Show-in-Print will review new developments in the electrical construction, maintenance, and transmission and distribution fields. Product information in the following categories will be featured: Electrical Wiring Products and Devices; Lamps, Fixtures, and Luminaires; Motors and Control; Installation Tools and Testing Equipment; Electrical Heating and Ventilating Equipment; Transmission and Distribution Equipment; Substation Equipment; Metering and Instruments.

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You will find it pays in more ways than one to take another look at Fasco. You'll see a complete line of ventilating fans all with smart, "no-rust" aluminum grilles. You'll see ventilating fans that cut installation costs . . . the slimmest ventilating fan on the market . . . and a host of other features in this value-packed line designed and priced to reduce your costs.

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There's a fresh look at FASCO

Please send me full information on the Ventilators and new power Range Hoods

▼NAME and ADDRESS ▼CITY and STATE ES-458

Chicago, New York, Atlanta and Dallas to introduce the sales representatives to the company's 1958 "Time" educational and merchandising campaign. The unusual sales meetings were highlighted with an atmosphere of "music from outer space" and "satellites" buzzing around meeting rooms. Representatives watched presentation skits by sales personnel dressed in outer-space suits.

* * *

EAGLE ELECTRIC Mfg. Co., manufacturers of electrical wiring devices, has enlarged its facilities for the production of their socket line. Eagle has acquired the assets of the Matol Corporation, the automatic screw machine department of Chase Brass and Copper Co., and the Bottom Turn Knob Socket Division of Alcor Mfg. Co.

* * *

FLUORESCENT FIXTURES of California, manufacturers of All-Brite luminaires, has announced a 20,000 sq. ft. addition is currently under construction at their South San Francisco plant. The addition will increase manufacturing and storage facilities to 130,000 sq. ft. at the main plant.

* * *

THE SUPREME COURT recently denied the request of Minnesota Mining and Manufacturing Company that it review 3M's patent infringement case against Plymouth Rubber Co., Inc., of Canton, Mass. This ends favorably to Plymouth some years of litigation involving patents on formulas in the making of plastic electrical tape.

Technical Institute formed in Alabama

FORMATION of the Mid-South Technical Institute offering basic and advanced training in the electronics, electricity, air conditioning, and refrigeration fields was announced in Birmingham.

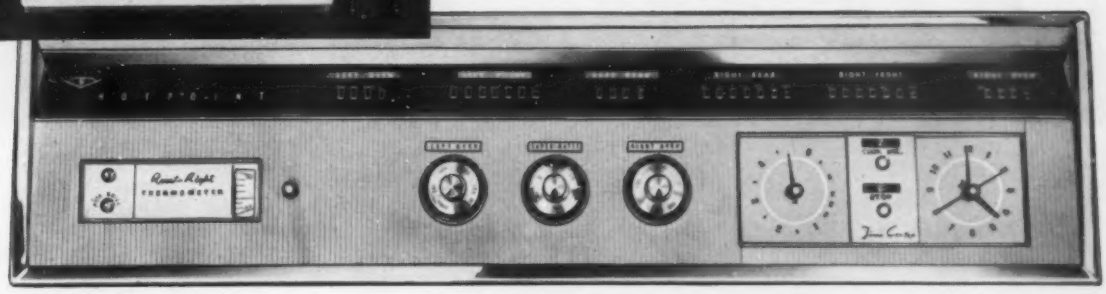
The Mid-South Technical Institute has taken over facilities and staff of the Commercial Trades Institute, a private organization, and the new institution will operate on a non-profit basis under the direction of a Board of Trustees composed of twenty-five Alabama business men.

J. Hill Foster, who formerly operated Commercial Trades Institute, has been named to the presidency of the new organization.

The need for well-trained technical men in the fields covered by the training program of the Mid-South Technical Institute has been termed one of the most pressing needs of the nation.

Hotpoint ELECTRIC RANGES

have the Difference
that builds load
and revenue...
automatically!



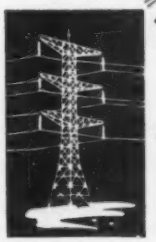
Hotpoint Electric Ranges help you build sales, load and revenue with all of the brilliant advances in quality, styling and completely automatic operation that make up the Hotpoint Difference. For example, the distinctive new control panel above provides automatic command of all surface and oven units—both time and temperature—at the touch of a button.

There's an exclusive new "thawer oven" that thaws frozen foods faster, doubles as a surface baking unit. And a new "touch open" storage drawer that glides out in response to a touch of the toe or hand. An exclusive accurate meat thermometer in the Super Oven, controlled with one simple setting, signals when the roast or fowl is done just right.

These imaginative, yet practical advantages are just a few samples of the sale-exciting features offered by the dramatic Hotpoint Difference. Hotpoint Ranges will help you put more POWER in "House-Power"—more LIVING in "Live Better—Electrically!"

Ask your Hotpoint Distributor to show you the Hotpoint Difference in the 5 NEW 39-inch models and the 3 NEW 30-inch models for 1958!

LIVE BETTER ELECTRICALLY



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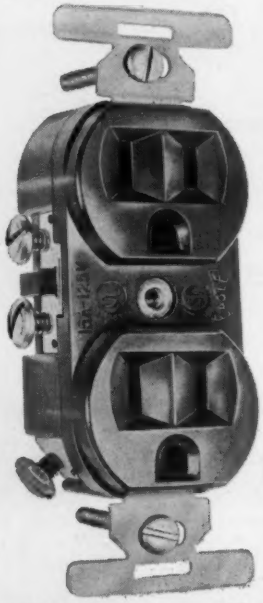
(your customers do!)

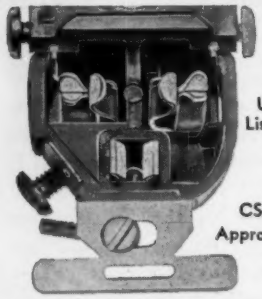
CALLBACKS
"LIKE BANANAS"
COME IN BUNCHES

AVOID CALLBACKS by specifying Eagle wiring devices like this fabulous No. 827

"U" GROUND
DUPLEX RECEPTACLE



DOUBLE-WIPE PHOSPHOR
BRONZE "T" CONTACTS



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MFG. CO., INC.

LONG ISLAND CITY 1, NEW YORK

News about people

Six management appointments in the sales department of **Kaiser Aluminum & Chemical Corporation's** recently established Electrical Conductor Division have just been announced by **Gillette N. Houck,** division sales manager.

They are, **J. C. Ferguson,** product manager; **R. J. Harrison,** assistant product manager; **H. F. Johnson,** administrative manager; and three program coordinators including **J. A. Leuver,** industrial, light and power; **H. H. Weber,** utilities, and **P. W. Ward,** distributors and warehouses.

The appointments, according to Mr. Houck, are in conjunction with the organization of the Electrical Conductor Division's new general sales office in Chicago.

K. B. Lacy, president of **Lighting Products, Inc.,** has announced the appointment of **E. H. Church** to the position of vice-president in charge of sales and operations.

Burton Schellenbach has been named vice-president of sales for the **H. K. Porter Co., Inc.,** according to an announcement of **C. L. Holbert,** president.

Mr. Schellenbach, a graduate of the University of Cincinnati, is a veteran of nearly twenty-five years in marketing. He has been associated with the marketing, sales and advertising efforts of the Aluminum Company of America, Fafnir Bearing, Nicholson File, The Stanley Works, plastics divisions of Union Carbide, and Roebling.

James H. Goss, vice-president and group executive for **General Electric's** Consumer Products Group has announced the appointment of **Charles R. Pritchard** as special consultant to GE's Supply Company Division.

Mr. Pritchard has been affiliated with GE since 1918. In 1940 he was elected a vice-president of the General Electric Supply Co., and in 1950 was elected president and a director. When the distributing organization merged with the parent company and became a division in 1956, Mr. Pritchard was named general manager.

Mr. Goss also announced the appointment of **William C. Wichman** to the position of general manager of the supply company division.

Mr. Wichman became associated with GE upon graduation from Iowa State College in 1928. He has since held positions in cost and work accounting, was manager of the specialty transformer and ballast department, and was general manager of the components products division. Most recently he was general manager of the industrial power components division.

The City Public Service Board of San Antonio, Texas, recently announced the appointment of **Otto W. Sommers** to the position of general

Otto W. Sommers

manager. Mr. Sommers replaces **Victor H. Braunig** who will continue as engineering and management consultant.

Associated with the company since 1929, Mr. Sommers has for the past six months served as assistant general manager and prior to that was executive assistant to the general manager since 1949. He is a graduate of Texas A & M College.

Also announced was the appointment of **J. E. Sheehan** to the post of executive assistant to the general manager. Mr. Sheehan most recently held the position of staff engineer.

Day-Brite Lighting, Inc., has announced the appointment of **Milton Price** to their department of new product development.

Mr. Price brings long business and manufacturing experience to his new position, having been president of the Artcrest Manufacturing Co., of Chicago, for twenty-four years.

The appointment of **E. N. Avegno,** general sales manager, as executive assistant, and of **Charles J. Sinnott** to succeed Mr. Avegno as general sales manager was announced recently by **George S. Dinwiddie,** president of **New Orleans Public Service Inc.**

C. J. Sinnott

Mr. Sinnott brings to his new responsibility many years of experience in utility sales promotion. He attended Tulane University before starting with Public Service in 1937 as a commercial sales representative. He was later transferred to the Residential Division, where he became group supervisor, customer service supervisor, and later general supervisor. In 1952 he became residential sales manager.

Mr. Avegno has been associated with Public Service and predecessor companies since 1903, most of his career having been in the sales field. He became head of the Dealer Sales Division in 1934, and during World War II was acting general sales manager. He returned to his position as dealer sales manager until 1954, when he became general sales manager.

Harry H. Kellogg has been appointed assistant sales manager of **Diamond Wire and Cable Co.,** according to a recent announcement by **J. M. Townsend,** vice-president.

Mr. Kellogg was formerly sales service manager, supervising inside sales activity. In his new post he will continue to supervise inside sales as well as assist in the management of field sales activities.

W. J. Berry, southeastern district manager of **Graybar Electric Co., Inc.,** has announced the appointment of **W. K. Collum** as manager at Roanoke, Va.

Mr. Collum joined Graybar in 1936 as elevator operator at Philadelphia. During the following year he was employed in the warehouse and as a lamp sales record clerk. In 1940 he moved up to assistant to the merchandising manager and then to salesman. He became manager of lighting sales in 1950, the position held until his present appointment and transfer.

Announcement has been made by **Smithcraft Lighting** of the appointment of **George T. Wood** as manager

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of lighting sales. Mr. Wood has held sales management positions with the Graybar Electric Company and the Lewyt Corporation.

Herbert Nock will continue as Southern and Western Divisional Sales Manager for Smithcraft and **Charles A. McKenna** will continue as Eastern Divisional Sales Manager.

The following executive promotions, reflecting expanded marketing activity in **Federal Pacific Electric Company's** Middle Atlantic Region, have been announced by **R. L. Bobo,** general sales manager.

C. G. Landeck becomes distributor products sales manager for the region, with prime responsibility for apparatus sales to distributors and contractors. He was formerly product manager, switch and fusible equipment.

George A. Bury moves up to product manager for switch and fusible equipment, taking staff responsibility for sales and manufacture of this segment of the company line. Previously he was district manager in Baltimore.

F. C. Karlson becomes Baltimore District Manager, reporting to Middle Atlantic Regional Manager H. E. Knudson.

F. L. Odum

W. L. Porter

W. I. Vawter

A realignment of the Southeastern sales territory for **Bryant Electric Company** has brought about several changes in sales personnel and one new territory, reports **F. C. Adams,** regional manager.

William L. Porter has been appointed to represent Bryant in part of South Carolina, East Georgia and North Florida. He will headquarter in Jacksonville. Mr. Porter was formerly associated with a manufacturers agent covering the same territory.

James A. Briggs, who previously represented Bryant in Florida with headquarters in Jacksonville, has been transferred to Tampa and will now cover Southern Florida.

F. L. (Roy) Odum becomes Bryant's representative for North Carolina, with headquarters in Greensboro. He will also cover parts of Tennessee and South Carolina. Mr. Odum is an electrical engineering graduate of the University of Florida and was associated for ten years with an electrical supply company in North Florida.

William I. Vawter was named by Bryant to cover parts of Georgia, Alabama and Tennessee. He will headquarters at 31-16th St., N.W., Atlanta. Mr. Vawter's past experience includes an association with a manufacturers agency and an electrical supply concern.

EASY-TO-SELL

and They Stay Sold!

"Buffalo" Breez-Air

ATTIC FANS

- **Designed to be QUIET**
- **Ruggedly-Built to Stay QUIET**
- **Higher Capacities Mean Greater Ventilation**
- **Easy-to-Install**
- **Extra PROFITS in Breez-Air Accessories**

The name "Buffalo" teams up to **help you sell** — "Buffalo" quality construction results in **permanent customer satisfaction!** No come-backs with Breez-Air ATTIC FANS!

Get your share of this season's attic fan business! Write for Bulletin 3865, prices, displays, sales aids, simple installation diagrams. INSURE YOUR ATTIC FAN PROFITS — WRITE TODAY!

"Buffalo"

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Buffalo Pumps Division • Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS • BELTED VENT SETS • PROPELLER FANS • "E" BLOWERS-EXHAUSTERS

Announcement of the appointment of **Frank L. Mathes,** director of sales, to the position of vice-president has been announced by the **Arrow-Hart & Hegeman Electric Co.** In this post, he will be responsible for directing and coordinating sales of wiring devices, motor controls, enclosed switches and appliance switches.

Mr. Mathes joined Arrow-Hart as administrative assistant in 1956 following an association as plant manager for leading industrial firms. He attended Trinity College and is a graduate of New York Military Academy.

G. L. Roberts, vice-president of **Simplex Wire and Cable Co.,** has announced the appointment of **John M. Murray** as sales manager.

Mr. Murray has been assistant sales manager since 1952. He has been associated with Simplex for the past thirty years and has held various positions in the electrical research laboratory, engineering department and sales department. He is a graduate of Northeastern University.

Charles W. Sanford has joined **Crouse-Hinds Company** as vice-president, manufacturing, according to a recent announcement by **J. R. Tuttle,**

president and chairman of the board. He will direct and coordinate all manufacturing, industrial engineering, production planning and procurement for the company.

Mr. Sanford, who succeeds the late **Albert H. Clark,** was formerly associated with the Philco Corporation in Philadelphia and Jack & Heintz in Cleveland.

Lee B. Thomas has announced his retirement as president of **Thomas Industries Inc.** He will continue as chairman of the board of directors and as chief executive officer.

Frederick Keller, formerly executive vice-president of Thomas Industries, was elected president and a member of the board of directors. Mr. Keller fills a vacancy on the board created by the resignation of Heywood Fox.

Mill-Power Supply Company of Charlotte, North Carolina, has announced the opening of a new sales office at 1704½ Battleground Ave.,

Bob M. Foster

Greensboro, to be headed by **Bob M. Foster** and **George S. Moore.** "The new office and increased sales staff will make it possible to offer better service to industrial and contractor customers in the central piedmont section of North Carolina," commented **B. Merritt,** vice-president in charge of sales for Mill-Power.

Appointment of **Frank M. Nolan** as manager of sales, switchgear department, has been announced by **Allis-Chalmers.**

An electrical engineering graduate of Purdue University, Mr. Nolan joined Allis-Chalmers in 1943. Upon completion of the firm's training course for graduate engineers he served successively as an assistant engineer in engineering development, a product specialist in industrial sales, and an application engineer in the switchgear department.

Each of the two illustrated troughs can carry as much cable as all of the paralleling conduit

Cope cable trough saves steel by the ton!

Problem. 100 miles of cable to be supported in a New Jersey power generating station.

Solution. A careful cost analysis of available methods and materials convinced plant engineers that Cope's expanded-metal cable trough was the best choice. Why? Among other reasons, it meant a saving of more than a ton of steel for every 60 feet of trough installed, as compared to conduit . . . a total saving in excess of 250 tons of steel for the 15,000 ft. of trough required for the completed job!

Here's How You Save. *One* 10 foot section of 24" width Cope trough supports as many cables as 16 lengths of 4" conduit and it only weighs 54 lbs., compared to 575 lbs. for this same amount of conduit. This adds up to real economy regardless of the size of your installation. Cope's expanded-metal cable trough simply uses *less* steel to do the job and obviously this can mean substantial savings for you!

Cuts Labor and Maintenance Costs, Too. Design and construction features of lightweight Cope trough speed installation of space saving systems—even in the most cramped quarters. Easy-to-get-at trough simplifies cable inspection and repair . . . provides ready re-routing and facilitates system additions.

You save *three* ways when you specify Cope cable supporting equipment . . . trough, ladder or channel.

- **LOWER FIRST COST**
- **LOWER INSTALLATION COSTS**
- **LOWER SYSTEM MAINTENANCE COSTS**

Discuss these advantages for *your* installation with a qualified Cope representative—or write to T. J. Cope Division, Rome Cable Corporation, Collegeville, Pa.

10C0B

T. J. COPE *Division*

ROME CABLE CORPORATION

The appointment of two new sales managers has been announced by **Frank L. Mathes,** vice-president and director of sales for the **Arrow-Hart & Hegeman Electric Co.**

Leslie A. Goodwin becomes sales manager of distribution sales, wiring devices division.

Mr. Goodwin joined Arrow-Hart in 1949 as a sales representative in South Texas. He later became southeastern district manager in Atlanta.

Leslie A. Goodwin

Mr. Goodwin attended Southern Methodist University and was engaged in the electrical wholesaling business before becoming associated with Arrow-Hart.

Howard J. Varley

Howard J. Varley was named sales manager of the appliance switch division. Mr. Varley has been associated with Arrow-Hart for the past twenty years and has held various sales positions in the appliance switch department. He was most recently manager of the New York Metropolitan District.

D. L. Harper, peninsular district manager of **Graybar Electric Co., Inc.,** has announced the appointment of **R. W. Wright** as operating manager at Jacksonville, Fla.

Mr. Wright joined Graybar, Jacksonville, as a voucher clerk in 1942. Since that time he has held positions as creditman, warehouse foreman, buyer, head of stock maintenance, and office salesman—at the Jacksonville office. At Miami he served as operating manager and at Tampa as office salesman, operating manager, and manager of merchandise investment.

Two assistant sales managers have been appointed by **James J. Hennessy,** sales manager of the Utility-Industrial Division of **Burndy Corporation,** manufacturer of electrical connectors.

Herbert Grossman becomes assistant sales manager of commercial activities. A sixteen-year veteran of

Herbert Grossman

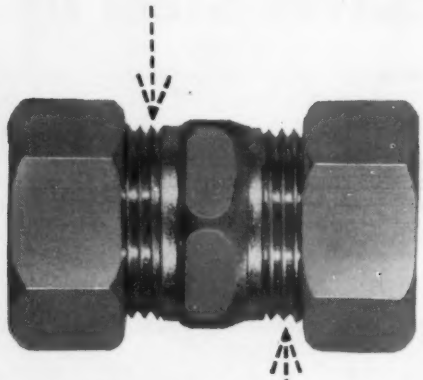
Burndy, and formerly manager of sales service, Mr. Grossman attended the College of the City of New York.

Richard Harap assumes duties as assistant sales manager of product

Richard Harap

activities. With the company since 1948 and formerly chief field engineer, Mr. Harp is an engineering graduate of Cornell University.

The board of directors of **Penn-Union Electric Corporation** announces the election of **Clinton G. Gerlach** as president and director. Mr. Gerlach, a certified public accountant, joined Penn-Union in 1952 and has served as controller, treasurer and vice-president.



Full perfect threads

work faster and easier

BLACKHAWK EMT FITTINGS have full, true, perfect threads for ease and speed of installation. Bodies of heavy steel — cadmium and zinc finished to eliminate corrosion on the unit itself. Blackhawk's new EMT fittings are rain tight. Quality controlled at every phase of the manufacturing. In demand for electrical jobs large and small because they're easy to use.

Blackhawk's new EMT fittings are a product of continuing Blackhawk research and automated methods of manufacture. Order a stock today to meet the demand for these quality made, EMT fittings. A complete range of sizes is now available.

Blackhawk Industries, Dubuque, Iowa

Where the new ideas come from

Steel City Electric Company announces the appointment of **W. H. Satterfield** as general sales manager. Mr. Satterfield is eminently qualified for his new position. He brings to the company years of experience in the

W. H. Satterfield

application and sales of electrical construction materials. As general sales manager, he will have full responsibility in establishing policy and in directing the sales efforts of this Pittsburgh company.

Gerald E. Hertig has been appointed substation application engineer for the **R&IE Equipment Division** of I-T-E Circuit Breaker Co.

A graduate of the University of Michigan, Mr. Hertig also completed the power systems engineering training course with GE. He has since

Gerald E. Hertig

been employed by Commonwealth Associates, Inc. At R&IE, Mr. Hertig will serve as substation design and equipment application specialist.

Edward A. Murray has been named assistant vice-president of sales for **American Steel & Wire,** a division of United States Steel Corp., according to a recent announcement by **Harry M. Francis,** the division's sales vice-president.

Mr. Murray replaces **M. D. Millard** who was recently advanced and transferred to U. S. Steel, Pittsburgh, as an administrative vice-president.

Low cost lighting maintenance with Revere hinged poles

Hinged poles, engineered to hold from 1 to 4 floodlights, are available in round, square and square-tapered models in heights from 18 to 30 feet.

Reduce the cost of relamping, cleaning and maintenance by using Revere hinged poles in your outdoor lighting installations. No matter who provides lighting maintenance, it's performed more quickly, safely at ground level. The cost of using boom trucks is eliminated. Hazardous and time-consuming use of long ladders is avoided. First cost of Revere hinged poles is no more than ordinary light poles.

From a quality standpoint, Revere hinged poles are built for rugged duty and will withstand wind loading of 100 m.p.h. Check with your electrical supplier on other cost and quality advantages of Revere hinged poles.

Write for complete Revere catalog

Revere ELECTRIC MFG. CO.

Revere Electric Mfg. Co., 6009 Broadway
Chicago 40, Ill., UPtown 8-7100

Available in Canada thru Curtis Lighting, Ltd., Leaside, Toronto, Ontario

Outdoor Lighting: Industrial • Commercial • Service Stations • Streets • Sports • Airports • Shopping Centers

HERE'S WHY

FURNAS MAGNETIC STARTERS ARE SUPERIOR

MAGNETIC STARTERS

Furnas Electric offers the right control for every job. Expertly designed and made of the best materials, Furnas starters assure you long, trouble-free operation. Only Furnas provides a choice of 10 starters, instead of the usual 5, through Size 4.

CONTACT BLOCK

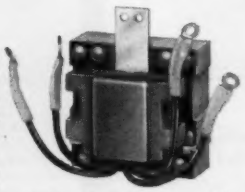
Of Plaskon Alkyd . . . non-tracking . . . deep arc chambers . . . pressure connectors over 5 hp . . . extra switchlet interlock can be added to either side.

CROSS ARM ASSEMBLY

Molded of reinforced high impact material for long life . . . stainless steel contact springs resist corrosion . . . special alloy contact backing and contact guide posts provide superior bearing surfaces . . . special weld resistant Silver-Cadmium oxide D54X contacts for long dependable life.

MAGNET ASSEMBLY

Dual voltage coil, 110-220 or 220-440 volts . . . single moving part . . . coil resists moisture, fungus, combustion, age, thermal and mechanical stress . . . 100% noise tested . . . efficient low wattage design.



THERMAL OVERLOAD RELAY

Melting alloy principle assures repeat performance . . . simplified design—only two moving parts . . . non-adjustable trip assures tamper-proof operation . . . 100% factory inspected for trip-out and heater coil resistance.

For full information write for Catalog 5800, 1064 McKee Street, Batavia, Illinois

A47

FURNAS ELECTRIC COMPANY

BATAVIA, ILLINOIS

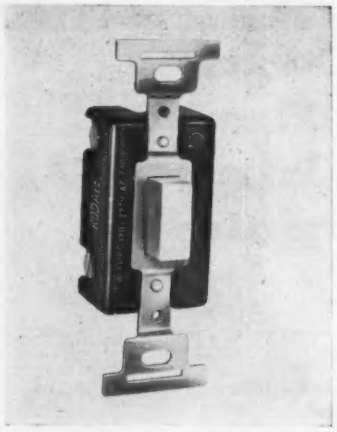
New products

Touch action wall switch measures one inch deep

THE RODALE Manufacturing Co., 6th and Minor St., Emmaus, Pa. announces the addition of the Model "B" Touchette to its line of touch action switches.

Like the original single button Touchette, this new, inexpensive switch requires only slight pressure to turn on lights. Another touch, and it immediately flicks lights off again. There is no time wasted freeing the hands, no spilling or breakage while juggling trays or groceries. Its easy operation makes "B" Touchette a "natural" for today's push-button living.

"B" Touchette combines this feature-light operation with easy installation. It measures just one inch in depth, thus allows for quick, simple installation, even in boxes where several wires already enter. "B" Touchette also fits standard outlet boxes and toggle wall plates. For the homeowner who is planning remodeling



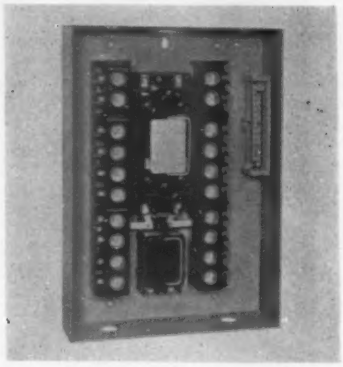
and rewiring, it means that "B" Touchette can be installed by either an electrician or the do-it-yourselfer without even running into the expense of replacing favorite wall plates. Naturally, in new construction, "B" Touchette allows the choice of any type toggle wall plate.

For additional data, ask for item P-419, using the coupon on page 143.

Low cost service entrance panel for 100 amperes

A SERVICE ENTRANCE panel featuring a 100 ampere main pull-out disconnect with 8 to 20 circuits has been announced by Murray Manufacturing Corp., 1250 Atlantic Ave., Brooklyn, N. Y.

Available with or without a 60 ampere pullout, this new panel can



handle many of today's increased load combinations at minimum cost.

Main pullout is series connected and controls all branch circuits. Subfeed lugs are supplied for future expansion of additional 240 volt service.

Knockouts, wiring room, gutter space are all designed to make installation easy. Main pullout is two blade with knife type reinforced fuse clips. Solderless connectors are used throughout. Available with surface or flush covers.

Panel is single phase, 120/240 volt AC, 3 wire. Takes 100 Ampere line connectors up to #1/0 AWG wire.

For additional data, ask for item P-420, using the coupon on page 143.

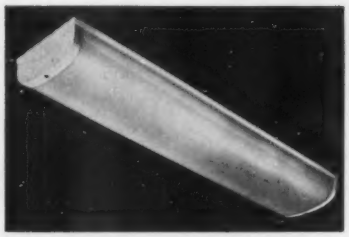
Unbreakable fixture for flush mounting

ESPECIALLY designed for use where violent handling or vandalism may be encountered is the "Security" fluorescent light fixture available from the Ruby Lighting Corp., 802 West Whittier, Calif.

The fixture fits flush against ceiling or wall and its sturdy plexiglas lens can resist virtually any human attack upon it. It can be opened for re-lamping only with a special tool. When closed, the fixture is dust- and bug-proof. Completely waterproof, it can be washed down with a hose at full pressure.

The Security is thus the ideal fixture for locations where rough usage and vandalism may be expected—in public subways, pedestrian tunnels, comfort stations, under overpasses, etc. Its sturdy construction prevents damage when the fixture is installed in such locations as gymnasiums, field-houses, pool areas, locker-rooms and basketball courts.

The Security is available in units to carry two, three or four fluorescent lamps. The rapid-start lamps can be changed in two minutes. An optional addition is an 8-watt "night lamp," when it is desired to provide



a low-illumination light when the main tubes are turned off.

For additional data, ask for item P-421, using the coupon on page 143.

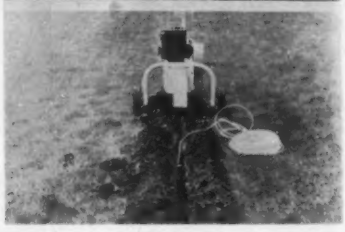
Automatic trenching machine saws through hard ground

AN AUTOMATIC trenching machine that literally saws through hard ground makes it possible to lay plastic pipe or underground electrical cable quickly and with a minimum of torn-up ground. The new ground saw trencher is available from the Cosom Engineering Corp., 30 East 42nd St., New York 17, N. Y.

The hardened steel teeth of the saw cut a sharp, clean trench two and one quarter inches wide even in rugged soil. Electrical cable with insulation of Bakelite vinyl resins is laid where hand trenching would be virtually impossible.

Three models are available that trench to depths of 12, 18 or 24 inches. The new machines have quick-starting 2¾ hp engines with a six to one gear reduction, and a fully enclosed drive for safety. The three-wheel unit is propelled by winch drive attached to an aircraft cable.

After starting the ground saw, and setting it for the desired depth, the operator acn turn to other work. The



machine can be operated at speeds up to three feet per minute, cutting a clean, straight trench automatically and halting at the end of the cable. There is an overload feature to reduce the speed in heavy digging.

It rolls on 10-inch semi-pneumatic tires across lawns without damaging the turf. Width and height are each

TRADEMARK OF SAFETY

ELECTROMODE All-Electric HEATERS

Mr. Safety Grid

Only Electromode Heaters have the Safety Grid —a cast-aluminum heating element with all electric wires completely sealed inside. Provides full protection against fire, shock or burn.

- EASY TO INSTALL
- NO CALL BACKS
- SATISFIED USERS

All Your Requirements from One Reliable Source

ELECTROMODE BASEBOARD HEATERS

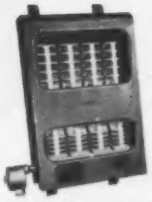
Electromode Heaters Are Made in More Than 100 Different Models. Write for Full Information.

ELECTROMODE WALL-TYPE BATHROOM HEATER

ELECTROMODE WALL-TYPE DOWN-FLO HEATER

ELECTROMODE RADIANT CABLE HEAT

ELECTROMODE PORTABLE and SUSPENSION HEATER



ELECTROMODE EXPLOSION-PROOF HEATER

ELECTROMODE SUSPENSION-TYPE HEATER

ELECTROMODE *division, Commercial Controls Corporation*

DEPT. ES-58 ROCHESTER 3, N. Y.

NOW – AN ENTIRELY NEW CONCEPT IN

watertight

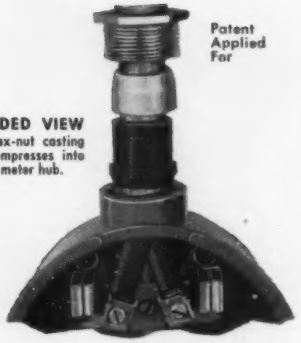
service entrance

connectors

THIS exclusive M&W fitting introduces a new high in simplified installation. The hex-nut casting compresses the neoprene gland *directly into the hub* of the meter socket. This permits a faster, easier installation. The conical metal sleeve gives ample take-up around the cable, prevents cable-twisting, and makes a more adequate seal with neater appearance.

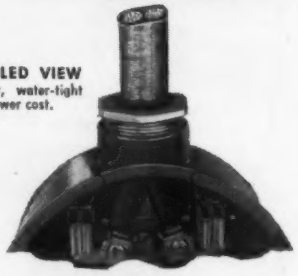
New HNS-23 M&W Connectors save time, cut costs, provide ONE connector to handle ALL sizes of 100-amp rated cable. Write today for sample fitting, prices and details.

Non-Water-Tight Connectors — Ground Clamps — Service Entrance Mast Kits — Service Entrance Caps, Straps and Sill Plates — BX and Romex Connectors



Patent Applied For

EXPLODED VIEW shows hex-nut casting which compresses into threaded meter hub.



INSTALLED VIEW A neater, water-tight seal at lower cost.

M&W Electrical Fittings

The M. & W. ELECTRIC MFG. CO., Inc.

EAST PALESTINE, OHIO

Latrobe PRODUCTS

FLOOR BOXES · WIRING SPECIALTIES

Adjustable Watertight Floor Boxes

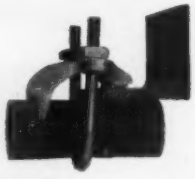
All adjustable boxes are now equipped with a positive bond which makes them completely fire-proof.

"Latrobe" Floor Boxes and Wiring specialties are clean and compactly designed to cut installation time to the bone and give smooth, trouble-free service.

"Latrobe" Products give a full measure of value.

"Latrobe" Pipe or Conduit Clamp

This clamp is made with a double safety bite of case hardened tool steel. Two models—Right Angle and the Parallel support. Each model comes in 10 sizes to handle pipe or conduit ½" thru 4".



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CARY CHAPMAN & COMPANY
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213 S. Front St., New Orleans 12, La.
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2516 Eighth Court North, Birmingham, Ala.
3370 N.W. 37th St., Miami, Fla.

F. P. WALTER COMPANY
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JIM ROBERTSON & COMPANY
2104 Irving Blvd., Dallas, Texas
1901 Commerce St., Houston, Texas

FULLMAN MANUFACTURING CO.

LATROBE . . . PENNSYLVANIA

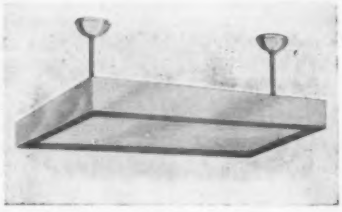
28 inches. The rear axle may be removed, reducing the width to 16 inches, thus permitting storage in truck tool compartments. The 12-inch and 18-inch models are 53 inches long, and the 24-inch model, 59 inches. Each unit weighs approximately 160 pounds.

For additional data, ask for item P-422, using the coupon on page 143.

Ceiling heater features no fan, all-radiant output

AMPERE INDUSTRIES, 60 Boston Street, Newark 3, New Jersey, announces a new all-radiant industrial and commercial ceiling electric heater for use in large, open or even exposed areas.

A unique feature of the Ampere C-257 is the Amp-Quartz element that produces volumes of long-wave infrared rays with a radiant efficiency of 91 per cent by certified laboratory



test. The All-Radiant output warms surfaces, objects and people keeping them completely warm and comfortable at lower temperatures and lower cost.

The performance and utility of this unit is outstanding. It has no fan, no hot blast of air, but it will keep individuals comfortable on loading platforms and equally exposed areas. A plant or large room can be completely zoned so that you heat only those areas that you wish to heat. Each panel is equipped with 22-inch suspension rods that firmly secure to ceiling, holding wires and panel in place. Larger rods can be furnished if repaired.

For additional data, ask for item P-423, using the coupon on page 143

Indoor lighting levels automatically regulated

A CONTROL SYSTEM that automatically regulates indoor lighting levels in commercial buildings according to the amount of prevailing natural light is being marketed by Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., S., Minneapolis 8, Minn.

Known as Light Saver Controlled Lighting, the system provides for major savings in electric power. Savings up to 80 per cent have been indicated in tests.

The Light Saver automatically measures incoming daylight and turns artifical lighting on or off in proper amounts to maintain the desired illumination in work areas.

This prevents electric power's being used when it is not needed.

A multi-stage operation of controlled lighting allows for gradual dimming of lights so the change is practically unnoticeable by occupants

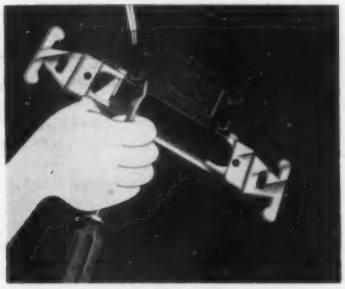
The system will find wide applica-in a room.
tion where glass block construction and skylights are used in buildings to distribute natural light throughout a room without annoying heat and glare.

For additional data, ask for item P-424, using the coupon on page 143.

One-hand wire release for switch and receptacle

IN ADDITION to the new compact design and "speed-wire" feature for easy, quick wiring, Model 600 Quiet Switch and 800 Receptacle offered by Slater Electric and Mfg. Co., Glen Cove, N. Y., also feature the new patented side release, for split-second, one-hand wire release without special tools.

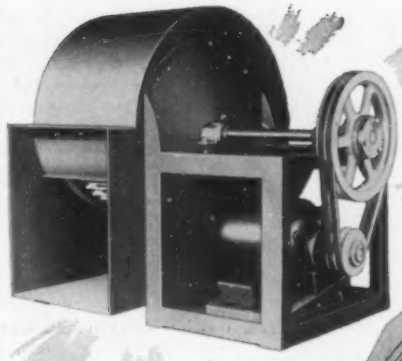
Without fumbling, bracing or supporting the unit in any way other than with one hand, the electrician



quickly and safely releases the wire by pressing lightly against a spring located in a slot on the side of each wire hole.

In the case of the 600, these holes are twins for holding two wires with a bulldog grip, either 12 or 14 gauge. This feature permits continuity of circuits to other switches and outlets. The wire is released instantly, clean, straight and ready to rewire.

For additional data, ask for item P-425, using the coupon on page 143.



Peerless Belt Drive
Backward Curve Blower

Peerless Belt Drive
Centrifugal Roof Ventilator

**TESTED AND RATED . . .
TO AMCA* SPECIFICATIONS**

**The New Air Moving and Conditioning Association formed by merging PFMA, NAFM and IUHA.*

As a charter member of AMCA, we are naturally vitally interested in listing and rating our air moving products according to AMCA specifications as set forth in the AMCA code. The products you see here are the two most important, basic products in our expanded line of air moving equipment. Along with other Peerless air moving units, they have been designed and manufactured to meet all AMCA standards. With this assurance, Peerless air moving equipment can be specified and installed with confidence. When you have an air moving condition which needs solving, call your nearby Peerless representative or the Peerless factory direct. We can all work together in helping you arrive at the best possible solution.

Write today for Bulletins SDA-160, SDA-200, and SDA-220!

A COMPLETE LINE OF AIR MOVING EQUIPMENT

Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

Peerless Electric

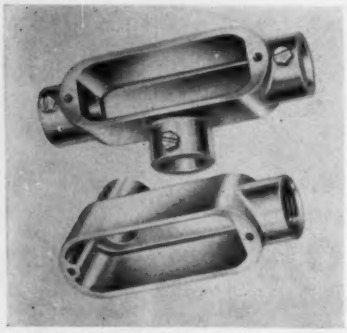
FAN AND BLOWER DIVISION
THE Peerless Electric COMPANY
1452 W. MARKET ST. • WARREN, OHIO
FANS • BLOWERS • ELECTRIC MOTORS

SEE OUR CATALOG IN SWEET'S

Die castings manufacturer adds conduit fittings line

THE L. E. MASON CO., 100 Business St., Boston 36, Mass., a leading producer of die castings has announced its entry into the conduit fittings field with their Red Dot line, which includes a complete range of styles and sizes.

According to Kenneth A. Sawin, sales manager of the newly formed Conduit Fittings Division, ware-



houses are being set up in the principal cities throughout the country for national distribution.

All the engineering skills and production know-how gained in 25 years of service to the industry, have been used in developing this new product line. Red Dot fittings will incorporate several innovations in design, and no effort has been spared to produce fittings that will be the finest in quality, yet competitively priced.

For additional data, ask for item P-426, using the coupon on page 143.

750 watt radiant glass wall mounted heater

MODERN BUILDING trends are gracefully complimented by the new 750 watt electric radiant glass heater developed by Berko Electric Manufacturing Corp., 212-40 Jamaica Ave., Queens Village, N. Y.

Designed for wall surface mounting, the new Model HBT requires only two screw fastenings for permanent installation. The design also makes possible a quick and economical heater installation in small rooms and bathrooms where space is at a premium. As a result, major wall alterations have been rendered unnecessary.

The entire unit has a maximum thickness of 3" including the metal guard. The elements of design and the compact arrangement of components all combine to create a built-in appearance after installation. All exposed metal parts are cool enough to touch. Other dimensions are 12-5/16" for the width and 17-1/4" for the height.

Operating on the infra-red principle, the Model HBT emits a full sensation of even warmth throughout the room because of the long infra-red waves which are absorbed by the wall surfaces and reflected back into the surrounding air. Model HBT comes in 120, 208 and 240 volts.

For additional data, ask for item P-427, using the coupon on page 143.

Weatherproof duplex U-ground assembly

THE LATEST in outdoor U-ground receptacle assemblies by Perfect-Line Mfg. Corp., Old Country Road and RR Ave., Hicksville, L. I., N. Y., is a rugged, weatherproof two-gang duplex U-ground assembly with dual seal-tight spring-hinged covers.

Designed to withstand snow, ice and rain it is also ideally suited to interior installations where exces-

sive moisture is, or is apt to be, present. This assembly may be used in metallic or non-metallic wiring systems for grounding metal parts of appliances or tools.

This new design by Perfect-Line is precision-made of aluminum finished brass plate, smoothly die-cast aluminum covers and trouble-free stainless steel hinge springs. It comes complete with a weatherproof rubber mat and self-sealing rubber gaskets in the covers.

Available with 15 ampere/125 volt, 15 ampere/250 volt and parallel slot 15 ampere/125 volt receptacles, this practical, inexpensive assembly comes packaged in lots of ten units, individually wrapped.

For additional data, ask for item P-428, using the coupon on page 143.

Light beam easily adjusted on outdoor substation unit

A NEWLY DESIGNED luminaire for outdoor substation lighting has been introduced by the Holophane Co., Inc., 342 Madison Ave., New York 17, N. Y.

The unit has as a light controlling element a *one piece* prismatic refractor made of thermally stable

NEW Low Cost ONE-PIECE TERMINALS

for BOTH stranded and solid wire

Buchanan production-line pres-SURE-terminals with exclusive pres-SURE-crimp are approved for both stranded and solid wire.

The pres-SURE-terminals are available in three sizes for wire sizes #22-#16, #16-#14, and #12-#10.

Both hand tools and press-dies are available.

Write for Bulletin S-4

or send us your specifications.

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BUCHANAN
ELECTRICAL PRODUCTS CORPORATION
HILLSIDE, NEW JERSEY

3P1

glass. A bottom reflector and top cover, both of spun aluminum, together with a threaded collar and fitter of cast aluminum complete the unit.

Over-all height is 20" maximum and 18½" minimum; maximum diameter 16⅜". Accommodates 400 or 250 watt mercury vapor lamps or 500, 300 watt incandescent. Fitter is arranged to slip-fit over 1½" pipe.

For additional data, ask for item P-429, using the coupon on page 143.

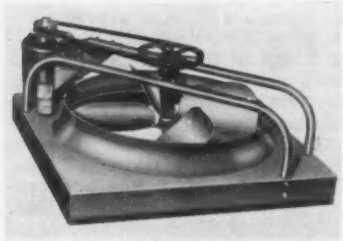
Attic fan installed horizontally or vertically

A LINE OF 2-way attic and exhaust fans designed to allow either vertical or horizontal installation and requiring less than the usual amount of head space is being introduced by Berns Air King Corp., 3050 North Rockwell St., Chicago, Ill.

Only 13½" high, the new fans with their special low design and 2-way mounting will fit almost any attic, enabling dealers to cut their attic fan inventory up to 50 per cent.

To further simplify installation, the fans will be pre-wired, with power leads brought to an outlet box for easy wiring, and will not require the use of a suction box.

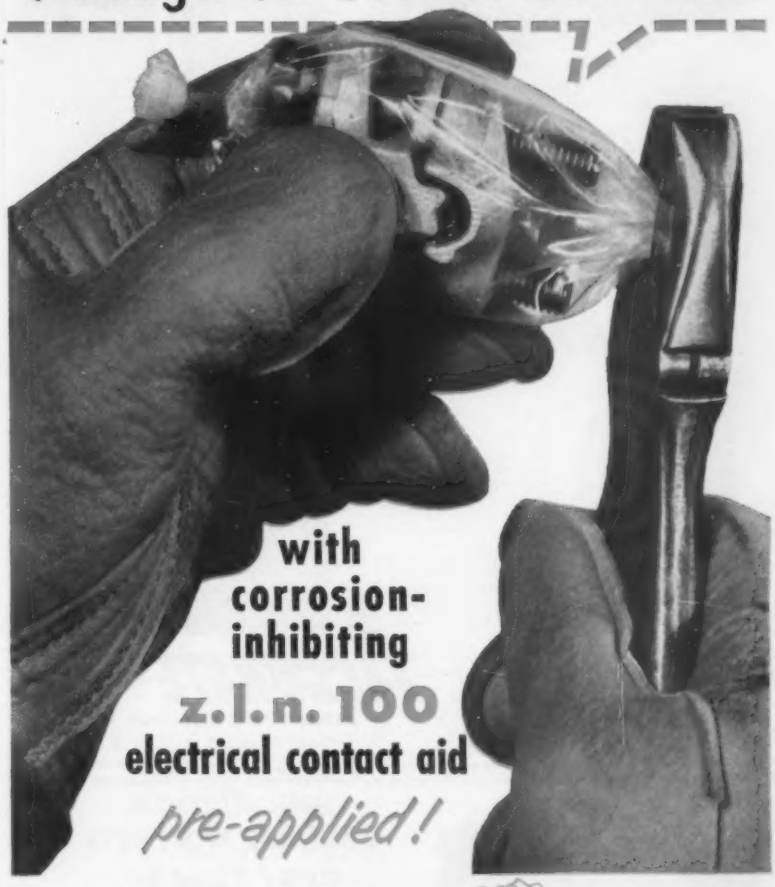
Available in 24", 30", 36", 42" and 48" models, the new line will feature precision balanced blades for quiet, large volume air delivery, built-in Thermoguard protector, sealed-for-



life ball bearings on the blade shaft, and a vibration-free resilient rubber mounted motor.

For additional data, ask for item P-430, using the coupon on page 143.

Packaged for Circuit Protection!



All Chance Uniclamps -Parallel Groove Clamps -U-Bolt Connectors -and Hot Tap Clamps are now available in individual plastic packages with z.l.n.100 pre-applied! Clamp stays clean . . . sealing tape reminds lineman to wire-brush and apply z.l.n.100 to the conductor too!

A·B·CHANCE COMPANY

GENERAL OFFICES: CENTRALIA, MISSOURI
(A·B·CHANCE CO. of Canada, Ltd., Toronto)

CC58-9

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PLASTIC

Send today for our most recent bulletin describing details.

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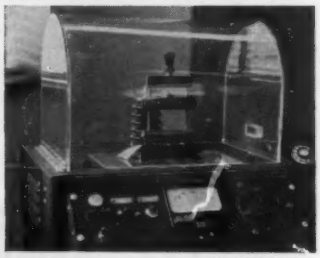
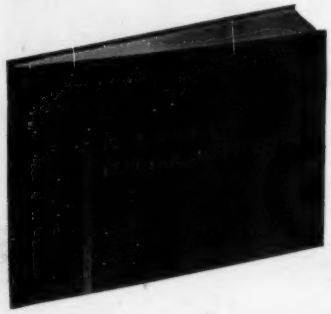


DIELECTRIC

ACCURATE
MANUFACTURING CO.
GARFIELD, NEW JERSEY



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Covers Over 2000 Wiring Jobs

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This book is easy to use—it has no complicated mathematics or formulas to work over. You merely determine the nature of the wiring, check it in the BLUE BOOK OF ELECTRICAL ESTIMATING and there's your answer—it's the simplest estimating book ever written.

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This book was written by a successful electrical contractor and estimating engineer with over 20 years' experience. It has an entirely different method of determining estimates on wiring jobs. Electrical contractors, journeymen, architects, and engineers will find use for this book every day. Gives time required to do jobs along with complete labor charges in every state in the country. Order this book now at special introductory price of $7.75. As a special offer to Electrical South readers the publishers give a free copy of the latest National Electrical Code Book just for examining the 1956 Blue Book of Electrical Estimating.

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☐ I enclose $7.75 to save shipping cost.
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(April 1958)

Power-driven winder for cable and wire

KART-O-MATIC equipment, now available from Weber Electric Manufacturing Co., Inc., 15224 Kercheval, Detroit 30, Mich., greatly simplifies transporting and winding in the cable and wire rope fields.

The power drive used on Kart-O-Matics can be used on the Marion Coiler Stand and also for pulling cable through conduits and threading pipe. Kart-O-Matics are ideal for re-reeling cable from one reel to another.

Two Kart-O-Matics are available —kit #1032 and kit #1042. Kit #1032 contains cart model 2032-A standard pick-up cart including pick-

up shaft, 3 sets of reel bushings, and wire leveler; cart model 2032-B equipped with a drive shaft, 3 sets of reel bushings, wire leveler, locking device and power drive bracket; CVM meter and bracket, power drive unit with foot control switch. These carts will handle reels 32" wide weighing 2000 lbs. Kit #1042 is the same as Kit #1032 except carts will handle reels up to 42" wide weighing up to 3000 lbs.

For additional data, ask for item P-431, using the coupon on page 143.

Three-phase transformers for point-of-load mounting

THREE-PHASE power circuit transformers that can be mounted at the point-of-load have been announced by the Jefferson Electric Co., 910 South 25th St., Bellwood, Ill.

With a noise level of less than 45 decibels, these units are considered ideal for hospitals, office buildings, stores and other commercial buildings.

By mounting these new power circuit transformers at the point-of-load, much of the extra wiring and labor usually involved in converting this current to lower voltage requirements has been eliminated. They can be mounted to ceiling, wall, floor—on bottom, top, and/or sides.

The use of class B insulation reduces the size and weight of the units. By eliminating the dirt-catching cover and exposing the core surface, Jefferson says these transformers are safer and easier to clean, and run cooler with greater efficiency.

For additional data, ask for item P-432, using the coupon on page 143.

Technical books

Engineering management

"Management for Engineers," by Roger C. Heimer. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y., 453 pages, $6.75.

The engineer engulfed hour by hour in problems which have precise mathematical answers is frequently not conversant with the economic, social, psychological, and political complexities of management. But these subjective concerns greatly affect and often completely dominate the decisions of business management and are therefore given studied attention in this new book.

The author points out that such decisions must be based upon subjective as well as objective factors. This book will acquaint the reader with the day-by-day workings of a business firm both as an economic institution and as a coordinate organization made up of individual participants.

Designed to familiarize the engineer with the business firm's decision-making process, the book takes a practical look at the impact of costs, standards, materials, methods, taxes, insurance, power, equipment, labor, and ethics; and shows the relationship between them and engineering considerations.

The meat of depreciation accountancy; all the probable questions of the lawyer, accountant, or engineer are answered in the most abbreviated form currently available.

Heating guide book

"1958 Heating, Ventilating and Air Conditioning Guide," Thirty-sixth Edition. Published by the American Society of Heating and Air-Conditioning Engineers, 62 Worth St., New York 13, N.Y., illustrated, $12.00.

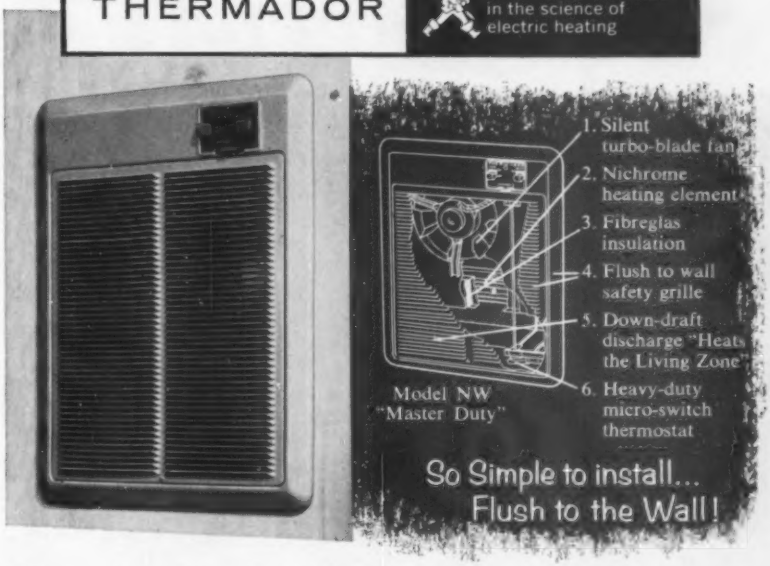
Of particular interest in the greatly revised and expanded 1958 Guide is the technical data section. Other revisions and additions include:

(1) Addition of both a description and a design method for high velocity air duct systems, (2) an enlarged section on the heat pump, (3) new information on exhaust hood performance and design for hot and cold processes.

(4) A simplified presentation of industrial drying principles, calculations, and system design, (5)

THERMADOR

"Seven Leagues Ahead" in the science of electric heating


1. Silent turbo-blade fan
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3. Fibreglas insulation
4. Flush to wall safety grille
5. Down-draft discharge "Heats the Living Zone"
6. Heavy-duty micro-switch thermostat
Model NW "Master Duty"
So Simple to install... Flush to the Wall!

The fastest "living-zone"*heater...

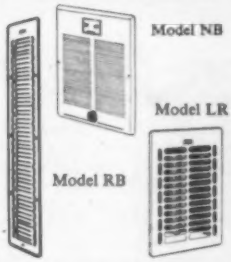
(*Head-to-heels area. Costly ceiling heat losses are minimized.)

THERMADOR "BILT-IN" ELECTRIC HEATER...

The popular Thermador Model "NW" Fan-type "Bilt-in" Electric Heater is designed to be installed quickly and easily between existing studding without extra framing. Powerful turbo-blade fan draws air into the heater, warms it in a heating chamber and gently distributes the heated air throughout the "living zone" of the room. Heating element safely out of the way of prying fingers. Fast heating nichrome wire – no heavy castings to pre-heat. Residual heat expelled so efficiently, heater is UL approved for top wiring. Equipped with top-located finger-lift controls, neon indicator light, thermostat for automatic control and safety thermo-cutout. The fan circulates heat in winter and provides cool air circulation in summer. Smartly designed, finished in Spanish Gold baked enamel. 2000 to 4500 watts output, 240 volts A.C., from 6824 to 15,354 BTUs per hour. Overall grille size-21" high, 16¾" wide, 1 5/16" from wall to edge of louver.

Safe, Reliable, Clean, Fast, Efficient

BILT-IN ROOM HEATERS



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The Originator of the Fan-Type Electric Heater

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See your nearest Thermador distributor or call or write the Thermador sales representative.

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Kan., W. Mo., E. Neb., Okla. — W. H. Faber Co., P.O. Box 7043 C.C. Sta., Kansas City, Mo.

Ark. — C. A. Birmingham, 3546 Oakley Ave., Memphis, Tenn.

La., Tex. — W. E. Tallman, 2236 Sutter St., Dallas, Tex.

Ill., Ind., N. Ky., E. Mo.— Klaton Chapman, 11-104 Merchandise Mart, Chicago, Ill.

Ohio — Robert E. Williams, 19119 Wickfield Ave., Cleveland, Ohio.

Md., Va., W. Va. — Warren J. Gottemeyer, Apt. E, 411 Hunting Towers, Alexandria, Va.

TOUGH PROBLEM Licked!

2-Point and 3-Point "PRA" Primary Resistor Starters at Sears Oil Co., one of nation's largest independent oil and gasoline distributors.

by New "PRA" REDUCED VOLTAGE STARTERS and *on-the-Job Service*

The Sears Oil Company, Rome, N.Y., had to control and protect large horsepower motors for pumps providing a flow into and out of storage tanks at its multi-million dollar deep water storage depot. Local power company regulations made reduced starting voltage a "MUST." Arrow-Hart was called in to solve this problem. Working with John Reed, local electrical contractor, Arrow-Hart field engineers came up with the answer — new Arrow-Hart Type "PRA" Primary Resistor Reduced Voltage Starters. Providing the necessary control and protection, they also met all local regulations governing low-voltage starting.

Small, light weight "PRA" Motor Controls, with "RA" Magnetic Starters, provide dependable, economical control. "Ribflex"* and "Edgeohm"* resistors assure correct starting current limitations. Overload relays are A-H bi-metal type. Starters can be wired for 2-wire automatic control or 3-wire push button control.

Whether your need is the *right* product for the job, or on-the-job assistance — or both — Arrow-Hart can serve you.

Write for more data on "PRA" Resistor Starters and complete information on A-H Sales Engineering Service to the Arrow-Hart & Hegeman Electric Co., Dept. ES, 103 Hawthorn St., Hartford 6, Conn.

*TRADE MARK OF WARD LEONARD ELECTRIC CO.

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Quality since 1890

MOTOR CONTROLS • ENCLOSED SWITCHES
APPLIANCE SWITCHES • WIRING DEVICES

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extension of data on heavy fuel oils and their use, with preheating, in automatic fuel burning equipment.

(6) New data on heat gain through glass block used in skylights, requirements for shading glass, and basic principles involved in calculating heat flow through glass areas, (7) a general revision of the chapter on radiators, convectors, baseboard, and finned-tube units and addition of new data on their ratings, and performance, (8) a revision of ranges of capacity for electrical heating units and a method of determining operating cost for these units.

(9) An enlarged section on performance and testing of air cleaners, (10) extension of list of allowable concentrations of air contaminants, (11) an increased number of codes and standards of interest to users of the Guide.

Electronic circuits

"Electron-tube Circuits," Second Edition, by Samuel Seely. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N.Y., 693 pages, $10.50.

Providing a broad background in electronic circuits, as preparation for work in radio and electronic engineering, the book first introduces the fundamental properties of electronic devices and their basic circuit applications. Then follows a discussion of a variety of untuned amplifiers, with and without feedback.

Next the book considers amplifiers having resonant circuits and studies tuned potential and tuned power amplifiers. The final and major sections contain comprehensive treatments of amplitude modulation and demodulation and frequency modulation and detection.

Wherever possible; the analysis proceeds in two stages. An effort is first made to present a physical explanation of the operation of the circuits. If feasible, a mathematical analysis of the operation of the circuit is then given.

Extensively rewritten, this second edition has been strengthened with new material to make a more complete presentation. These new materials include: analysis of RC feedback amplifiers; f-m discriminators; electronic computing circuits and devices; theory of clamping.

The treatment of the principles of feedback has been greatly expanded and there is new material on solid state electronics, the transistor, and the theory of transistor circuits of various types has been included. New problems have been added throughout.

Record changer manual

"Automatic Record Changer Manual, Volume 10." Published by Howard W. Sams & Co., Inc., 2201 East 46th St., Indianapolis 5, Ind., 148 pages, $2.95.

Covering ten record changers produced in 1956 and 1957, this new series will give more complete record changer coverage than previous Sams publications.

Complete authoritative coverage includes general specifications and operation data, changer cycle, mechanical adjustments, lubrication points, etc. For each changer covered there is complete information provided on troubles and probable remedies—plus a mechanical parts list.

Photos and exploded views give complete assembly and parts list information. A complete index of record changer coverage on this volume and other Sams publications is also included.

Hot line tools

"Hot Sticks," Published by A. B. Chance Co., 210 N. Allen St., Centralia, Mo., 162 pages, illustrated, $2.50.

Written in the lineman's language, this manual on high-voltage line maintenance describes and illustrates in step-by-step detail all important h o t-s t i c k operations. Sections are devoted to the operation and use of seventeen of the most-commonly-used t o o l s, the history and development of hot-line tools, and the setting up of training programs for hot-stick crews.

Hi-fi buyers' guide

"Hi-Fi Directory and Buyers' Guide," compiled by the editors of Radio and TV News and Popular Electronics. Published by Ziff Davis, 366 Madison Ave., New York 17, N. Y. Price $1.00. (Available on newsstands.)

This complete listing of all high fidelity equipment on the market is specifically designed to help the lay person choose the finest possible high fidelity equipment for his individual needs.

Much more than just a buying guide, the new publication also has appeal for the well-informed high fidelity enthusiast. The Directory offers detailed information on tuners, preamp control units, record players, changers, tone arms and accessories, and includes Eugene Ormandy's suggestions for setting up a basic classical record collection.

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LOUVRE LIGHTS and Quiette TAP ACTION SWITCHES

Putting extra value into your wiring jobs is the best possible way to satisfy customers and build your reputation. And—whether you're wiring a home, office or institution—no value is more appreciated than added safety. So, new work or modernizing, install A-H Louvre Lights on your next wiring job. Located on stairways and landings, in halls and bedrooms . . . and everywhere that darkness is dangerous or disturbing . . . these devices provide a soft, subdued illumination. Available with Bakelite or metal plates in desired finishes.

And to insure the ultimate in electrical convenience, team Louvre Lights—and all the other incandescent or fluorescent lights and outlets on the job—with A-H Tap Action Quiette Switches. They operate without disturbing noise, and turn on *and* off with just a tap of finger-tip, hand or elbow. Available for 15 and 20 amp service, 120-277 volts ac, they provide a lifetime of extra value at *no* extra cost.

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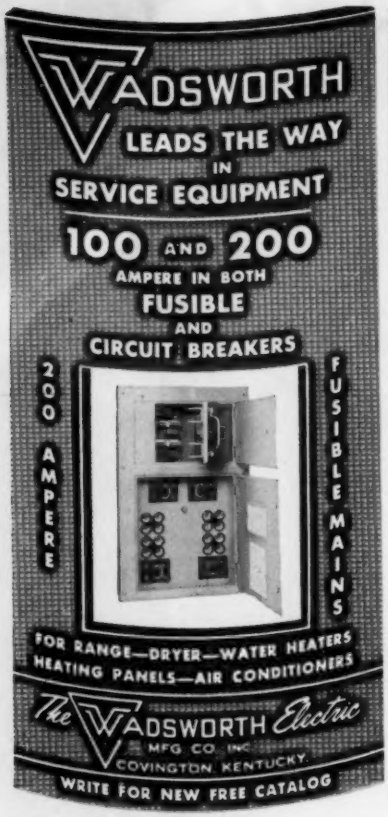


Free bulletins

available to our readers

Specifications sheets on its domestic line of **electric heaters** are available from the **Electromode Division** of Commercial Controls Corp., 570 Culver Rd., Rochester 3, N. Y. Front of sheet shows an installation of the heater illustrated in color, along with a description of the heater and suggested uses of the particular model. On the reverse side are complete specifications and an illustrated description of steps in installation procedures.

For additional data, ask for item B-433, using the coupon on page 143.

Electrical **insulating materials for repair and maintenance shops** are described in a 32-page price and product catalog published by **Insulation Manufacturers Corp.,** 565 W. Washington Blvd., Chicago 6, Ill.

Among the many products described in this latest publication from IMC are tapes and twines, sleevings, tubings, slot insulation, formed fibre and hard maple wood wedges, Silicone varnishes, mica products; also several pages devoted to "Mylar" and Rag paper combination and dispenser packaged cuffed paper and cuffed paper and Mylar combination insulations.

For additional data, ask for item B-434, using the coupon on page 143.

A new six-page brochure in full color depicting the new award-winning **"Sylva-Lume" lighting system** is available from **Sylvania Electric Products Inc.,** Wheeling, W. Va. Illustrated are uses of new package lighting system to create different luminous ceilings to suit each different interior. How the system can include sound conditioning is also explained.

For additional data, ask for item B-435, using the coupon on page 143.

A new 76-page catalog illustrating over 1,500 electrical **wiring devices, lamps,** and **specialty products** has been issued by **Eagle Electric Mfg. Co., Inc.,** 23-10 Bridge Plaza South, Long Island City 1, N. Y.

The publication is designed as a selling device, as well as a trade reference book. All products are grouped in categories cross-indexed to afford quick and easy finding.

For additional data, ask for item B-436, using the coupon on page 143.

Bulletin #57, a new six-page catalog, is available from **J. D. Polis Manufacturing Co.,** 2900 W. 26th St., Chicago 23, showing the complete line of Bulldog **expansion anchors and pin bolt drives.** Five types of self drilling expansion anchors for concrete are cataloged, with complete details given on Bulldog pin bolt drives and flush anchor holders, wire ceiling plates, hammer chucks and toggle bolts.

For additional data, ask for item B-437, using the coupon on page 143.

Electrical fixture distributors dealing particularly with builders, contractors, and electricians will find informative the new #57-A catalog, together with the #57-B flyer, **"Aids to Distributors,"** available from **Project Fixture Manufacturing Corp.,** 55 Ongley St., Rockville Centre, N. Y. Former illustrates 74 fixture styles, while the latter is especially designed for the distributor confronted with installation problems.

For additional data, ask for item B-438, using the coupon on page 143.

An illustrated eight-page folder, describing a new **outdoor fluorescent fixture** for lighting poster panels, store fronts, and walls, is available from **Revere Electric Manufacturing Co.,** 6009 Broadway, Chicago 40, Ill.

Bulletin #300-21 includes information on performance features, component parts, general specifications and prices, and typical installation parts-requirements.

For additional data, ask for item B-439, using the coupon on page 143.

Characteristics of and uses for **communication and power coiled cords** are described in a comprehensive 16-page catalog, made available by Cords Limited Division, **Essex Wire Corp.,** 121 Dodge Ave., DeKalb, Ill. An unusual feature is a complete "check list" which enables user to engineer and give complete specifications for obtaining and ordering a self-designed coiled cord to meet exact requirements.

For additional data, ask for item B-440, using the coupon on page 143.

Major operating and maintenance innovations of its new K-line equipment—sweeping **circuit breaker and switchgear** advancement — are featured in a new bulletin published by **I-T-E Circuit Breaker Co.,** Switchgear Division, 19th and Hamilton Sts., Philadelphia 30, Pa.

Advanced features of the new K-line breakers, whose ratings are 225,

A trainee taught us some ABC's

At a briefing of trainees one of the boys asked: "Can I buy U. S. Savings Bonds through the Company and have my deductions made automatically?" Frankly we had assumed that all of our employees knew all about the Payroll Savings Plan.

As a matter of fact, we've had the Plan in operation here for years. We decided to make sure that *everyone* on our payroll got full information, right away.

Our State Savings Bond Director saw to it that we got a full stock of promotional material to stimulate interest in U. S. Savings Bonds. After that he helped us to conduct a personal canvass and give everyone an application blank.

What happened next was surprising. Our employee participation jumped to a really substantial percentage. When our people had all the facts they were glad to gain the security that U. S. Savings Bonds offer them.

Today there are more Payroll savers than ever before in peacetime. Your State Director will be happy to help you install a Payroll Savings Plan or build enrollment in one already existing. Look him up in the phone book or write: Savings Bonds Division, U. S. Treasury Dept., Washington, D. C.

ELECTRICAL SOUTH

THE U. S. GOVERNMENT DOES NOT PAY FOR THIS ADVERTISEMENT. THE TREASURY DEPARTMENT THANKS, FOR THEIR PATRIOTIC DONATION, THE ADVERTISING COUNCIL AND THE DONOR ABOVE.

Ask your
Westinghouse representative
about the exclusive benefits
you get from

URL AND URF REGULATORS... WITH THE RELAY THAT "READS" THE VOLTAGE

Inverse-time delay characteristics permit the CVR relay to match the correction to the need, correcting for large voltage errors quickly, for small errors with moderate speed. Because it "reads" the voltage, interpreting the rate of change, corrections are made faster than with fixed-time delay relays.

URL and URF regulators meet *all three* basic voltage conditions more effectively because:

- Gradual voltage changes . . .
  relay operation immediately outside band limit.
- Large rapid voltage changes . . .
  lower relay operating time . . .
  faster correction.
- Irregular, self-correcting voltage changes . . .
  no relay operation.

Result: better voltage control, narrower effective bandwidth.

Call your Westinghouse representative for the full story of improved customer service through URL and URF regulators equipped with the inverse-time delay relay . . . made possible by PLOWBACK OF EARNINGS into research and development for better means of voltage regulation.

J-70869

YOU CAN BE SURE...IF IT'S Westinghouse

600 and 1600 amperes, are described and illustrated in detail. Innovations include quick-make manual closure, pull-down handle actuation and simplification of trip unit continuous-current ratings.

For additional data, ask for item B-441, using the coupon on page 143.

Of interest to the utility industry is a catalog just released by **Binkley Manufacturing Co.,** of Warrenton, Mo., which contains a unique **meter socket application and selection** chart.

The fifty-four page catalog contains sections devoted to 100 ampere sockets and troughs, 175 and 200 ampere sockets, enclosures for meters and transformers, utility storage racks, test blocks, guy guards and accessories.

For additional data, ask for item B-442, using the coupon on page 143.

The ultra-valve Type F **intermediate class lightning arresters** manufactured by **Line-Material Industries,** McGraw-Edison Co., 700 W. Michigan, Milwaukee 1, Wis., are described in a new bulletin available from the company. Included are complete tables of impulse sparkover voltages and discharge voltages.

Ultra-valve Type F arresters are available in voltage ratings of 20, 25, 30, 37, 40, 50, 60, and 73 kv. Their size and weight make the new arresters ideal for mounting directly on transformers and other substation equipment.

For additional data, ask for item B-443, using the coupon on page 143.

Seventy **portable electric tools and kits** with over 400 accessories for builders, utility and maintenance crews, carpenters, heating, plumbing and air conditioning contractors are described in Buying Guide 105, available from **Porter-Cable Co.,** 118 Exchange St., Syracuse, N. Y.

For additional data, ask for item B-444, using the coupon on page 143.

How to Use Capacitors (GEA-5632B), available from **General Electric Co.,** Schenectady 5, N. Y., is a 12-page booklet which describes the why's, where's, and how's of industrial capacitor applications. Problems and solutions connected with industrial capacitor selection are also discussed.

For additional data, ask for item B-445, using the coupon on page 143.

The **R & IE Equipment Division** of I-T-E Circuit Breaker Co., Greensburg, Pa., is offering a 24-page bulletin describing their type HPL-C **interrupter switches.**

Complete with application, dimension and ordering data, the new pub-

lication covers frame mounted, three-pole, fused and unfused switches, also metal enclosed switches, wall mounted and free standing. Ratings covered are 4.8 through 14.4, 600 and 1200 ampere.

For additional data, ask for item B-446, using the coupon on page 143.

Russell and Stoll Company, Inc., 125 Barclay St., New York 7, N. Y., has just issued a twenty-four page bulletin describing their complete line of **watertight floor boxes.** Natural, full color pictures of all types of floor boxes, technical cross-sections and many catalog data pages are included.

For additional data, ask for item B-447, using the coupon on page 143.

A sixteen-page, two-color catalog describing their line of inductor **air conditioners** for perimeter air conditioning of multi-storied buildings is available from the **American Blower Division** of American Standard, Tireman St., Detroit 32, Michigan. Complete inductor unit specifications are included.

For additional data, ask for item B-448, using the coupon on page 143.

An eight-page catalog, with information on the highlights of the company's **fluorescent lighting equipment** line is available from **Smithcraft Lighting,** 233 Everett Ave., Chelsea 50, Mass. The catalog provides a handy reference for architect, engineer, contractor and other lighting specifiers.

For additional data, ask for item B-449, using the coupon on page 143.

Drafting-room tool

(Continued from page 78)

is drawn on a small piece of white paper, then pasted onto the original sheet.

This entire sheet is then reproduced on the duplicator. So simple is the basic three-step operation of the copier, that all personnel in the drafting department can turn out translucent intermediates when called upon to do so. In conventional office use, copies are made on an opaque white paper; however, to facilitate the use of the copier for engineering drawing work a translucent paper is used in place of the white copy paper.

The draftsmen can then build-up the drawing directly on the translucent copy which, in turn, can be used to produce other copies. In other words, the fact that the copies are on a translucent paper means that each copy can serve as an intermediate to produce further copies. In this manner, it is possible for draftsmen to build-up the drawing where necessary, then make additional copies for distribution to contractors. No transcribing of data or drawings is necessary—only the addition of build-ups on each copy—thus assuring accuracy throughout the operation.

Formerly, it was frequently necessary for draftsmen to redraw entire sheets to make corrections on the copy. If additions or deletions represented 10% of the entire copy, 90% of the draftsman's work was devoted to redrawing of original material. And if more copies were required with additional changes, the same redrawing process had to be repeated.

Using the copier, however, the process boils down to simple terms. Make a translucent copy of the original on the unit; draw additions or erase deletions from translucent copy; and then run off necessary distribution copies on a direct process machine.

Thus, Vannort Engineers has been able to slash its drawing time in half through the utilization of a versatile copier—a machine which can do double duty by copying general office correspondence, as well.

Avenues of approach

(Continued from page 52)

reau's commercial wiring program.

An illustrated report on "Three-wire Wiring" was given by Howard Stevenson, manager of sales, Detroit Edison Co., and chairman of the Industry Committee on Interior Wiring Design. The presentation was based on an experimental wiring installation using 3-wire circuits extended around the perimeter of a ranch-type home.

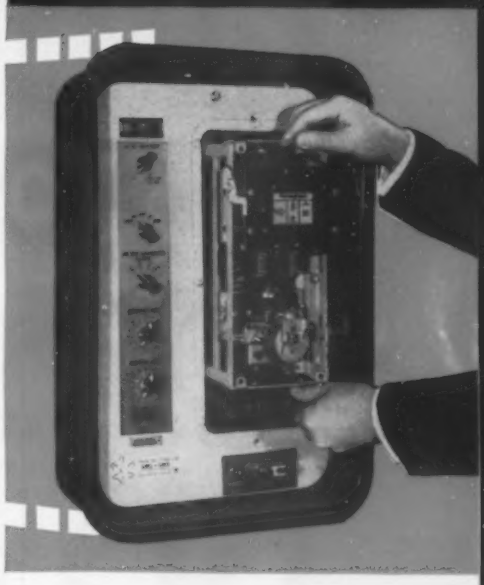
The results of an exhaustive survey of the wiring in a single village were given in a joint presentation by two Iowa Electric Light & Power Company men, James Rosche, adequate wiring advisor, and Clyde Clark, a division manager. There were two prime objectives in the survey. One was to test the effectiveness of wiring surveys as a sales promotion medium; the other was to determine the degree and nature of inadequacy in wiring prevailing.

A brief summation of the conference was made by Lester E. Barrett Electical Supply Co., St. Louis, Mo.

He emphasized the significance of the fact, presented by keynote

CVR RELAY... AID TO BETTER REGULATION ...WITH

* less maintenance
* easier maintenance
* adjustable bandwidth



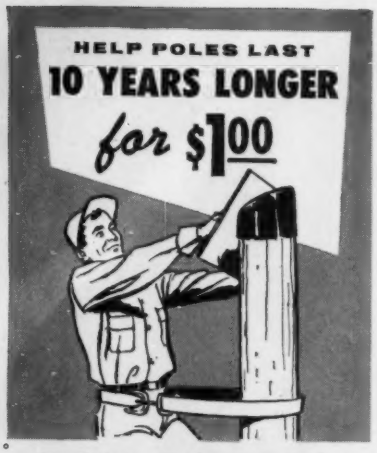
Because of built-in time delay, the CVR relay in Westinghouse URL and URF regulators operates its contacts only when a tap change is called for. Eliminating unnecessary operations reduces maintenance.

Maintenance is simplified by exclusive Flexitest* drawout construction which permits replacement of all relay control elements in only 10 seconds.

Lever-set voltage limits allow easy setting of the operating band, resulting in more accurate voltage levels. The time delay can also be adjusted easily and quickly.

* Trade-Mark J-70868

YOU CAN BE SURE...IF IT'S Westinghouse



POLE TOPPERS

Standing poles will last as much as 10 to 20 years longer if you protect the tops from water, fungus, wood fiber shrinkage or freezing and thawing with Pole Toppers. 15″ in diameter these Penta treated Pole Toppers can be applied by your own crews. Costs only $1.00. Send for sample order and test it out yourself.

OSMOSE WOOD PRESERVING CO. OF AMERICA, INC.
978 ELLICOTT ST. BUFFALO 9, N. Y.

KING RIGID-NOB CABLE STAPLES

New!

RIGID-NOB Design Provides Raised Driving Knobs — plus A Ridge Member To Assure Easy, Straight Installations

Bright Steel • Stainless Steel • Cadmium Finish

CONTACT OUR LOCAL REPRESENTATIVE

KING MFG. CO. INC., JAFFREY, N.H.

speaker Frank Roby, that appliance sales had increased 450% during a time when the number of wired homes in America increased only 75%. He also referred to new and near-future electrical appliances soon to become commonplace in our homes.

"If sufficient wiring is not installed for the accelerated electrical living," he said, "we'll be right back where we started!"

"Surely," concluded Mr. Barrett, "we should remember what speaker after speaker at this conference has told us—that our wiring problem is one that must be solved, and can be solved only by unified industry action."

A popular feature of the conference was the dramatic presentation by the Detroit Housepower Services demonstrating with skits and a narrator how that organization is handling Housepower promotion in the Detroit area.

Andrew Doremus of the General Electric Company, Bridgeport, chairman of the National Wiring Bureau's Plan Committee, served as conference chairman.

Microwave system

(Continued from page 73)

panies today use microwave in sections of their operations.

Microwave has several advantages over other means of communication. It is beamed from transmitter to receiver on a line-of-sight path and by use of reflectors can be bounced over or around mountains. Another advantage is that as no wires are involved, microwave is practically unaffected by ice or wind. Even lightning doesn't bother it.

A third advantage, Mr. Guill pointed out, is that the present microwave system will greatly expand the company's communications because it is designed for 25 voice channels.

Appalachian is now using carrier current (a means of sending messages along high-voltage transmission lines), leased facilities and long-distance telephone in addition to the microwave. Actually the new microwave system replaces a leased circuit between Roanoke and Charleston.

Microwave also provides clearer, more distant voice reception over long distance and is less costly to install and operate than conventional communication methods.

These two links in Appalachian's microwave system are the first in a system which some day may reach all points in the company's two-state territory. It is another in our efforts to provide the most dependable electric service possible.

Kentucky promotion

(Continued from page 50)

(f) We advertise in newspapers, on radio, television, billboards, car cards, etc.

(g) We run newspaper ads every Sunday of the year. Any builder who has an adequately wired house open for inspection on the Sunday of the ad, can have his name and location listed free. We average about 12 names per ad. This has been a big attraction to builders to participate.

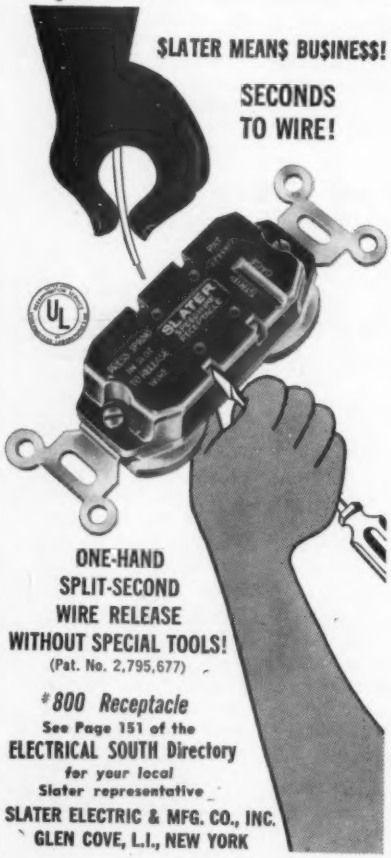
(h) Results—We certify about 10% of our new houses and influence another 20% to wire far better than code minimum.

We support the National Housepower Program in all its phases.

(a) We were one of the first utility companies to inaugurate a Wire on Time plan for wiring modernization. Actually, this was brought out in October of 1953 and we believe the success of the

SLATER MEANS BUSINESS!

SECONDS TO WIRE!



ONE-HAND SPLIT-SECOND WIRE RELEASE WITHOUT SPECIAL TOOLS!
(Pat. No. 2,795,677)

#800 Receptacle

See Page 151 of the ELECTRICAL SOUTH Directory for your local Slater representative

SLATER ELECTRIC & MFG. CO., INC.
GLEN COVE, L.I., NEW YORK

plan did much to trigger the national promotion.

Results of plan are as follows:

Number of jobs financed—5,600

Number of electrical contractors—603

Amount financed—$1,770,969

Average cost per job—$316.00

(b) We have furnished a committee member to EEI's Wiring Promotion Committee since the inception of the Housepower Program.

(c) Contractors refer to our Wire on Time plan in their telephone book advertising.

(d) We publicize all current Housepower promotions in daily papers on the Housepower Contest.

(e) We have held two Housepower Forums for electrical contractors in our area. These are schools of six sessions in which the contractor is taught how to sell wiring modernization.

Know the law

(Continued from page 90)

not a prerequisite to be complied with by all of the bidders. * * *

"However, the claim is that the condition may be waived by the municipality as between itself and the recalcitrant bidder. Both parties concede, at least by plain implication, that the award of the contract to Sternin [defendant] could have been successfully attacked by a taxpayer or another bidder (at least before exception of the instrument and the posting of a proper performance bond).

"But the township contends that a bidder should not be permitted to take advantage of his own default and that the right of waiver in the governing body ought to be sanctioned. The suggestion is persuasive on first consideration but loses its force when confronted with the strong public policy involved.

"The law is clear that bids must meet the terms of the notice. The significance of the expression 'lowest bidder' is not restricted to the amount of the bid; it means also that the bid conforms with the specifications. * * * "

"Minor or inconsequential variances and technical omissions may be the subject of waiver. * * * But any material departure stands in the way of a valid contract, and the defaulting person cannot be classed as a bidder at all. * * *

"Substantial noncompliance cannot be waived by the municipality. * * * The reason for this bar is

QUALITY

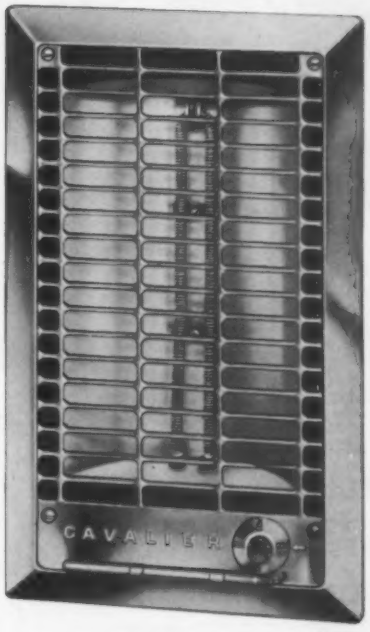
THAT BUILDS YOUR BUSINESS . . .

Lifetime Stainless Steel Exteriors

Solid Aluminum Reflectors

Galvanized Metal Wall Boxes

High Quality Liquid-Filled Thermostats



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Nothing to rust, deteriorate or cause callbacks! Rugged construction; withstand high heat and humidities. Performance that often sells complete home heating jobs! Same high quality, trouble-free thermostats found in nationally preferred Cavalier Wall Insert Heaters.

Model No.	Watts	Volts	Height of Wall Opening, Inches	Width of Wall Opening, Inches	Grille Frame Height, Inches	Grille Frame Width, Inches	Approx. Shipping Weight, Pounds	Operation	Retail Price
CB-1.25B	1,250	115/120	17½	9¾	19⅜	11¾	6½	Switch	$16.00
CB-1.25C	1,250	115/120	17½	9¾	19⅜	11¾	6½	Auto.	23.14
CB-1.5A	1,500	230/240	22	9¾	23⅞	11¾	9	Auto.	26.70
CB-1.5B	1,500	115/120	22	9¾	23⅞	11¾	9	Auto.	26.70

Retail prices slightly higher in West.

Sell With Confidence . . . Sell Cavalier!

ELECTRIC HEATING DIVISION

CAVALIER CORPORATION • Chattanooga 2, Tennessee

WALL INSERTS • PORTABLES • BATHROOM HEATERS
BASEBOARD • FLOOR FURNACES • HEATING CABLE

Over 90 Years of Quality Products

HEAT BETTER ELECTRICALLY

...just a few stars in
ELLIOTT'S COMPLETE
LINE OF FITTINGS

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Only Y-ER EAS has all these features

- Creamy, non-corrosive lubricant. Never greasy or messy.
- Prevents sticking or setting. Specially helpful on saddles and turns.
- Does not run back on cables.
- Never harmful to hands or clothing.
- Permanently non-harmful to cables or conduit.

Write for descriptive booklet

GIVES THE SLIP TO—
Lead, Rubber, Braid or
Synthetic Covered Cables

AT ALL LEADING ELECTRICAL SUPPLY HOUSES

ELECTRO COMPOUND CO.
4151 W. 150th St. - Cleveland 35, Ohio

obvious. When the waiver occurs, the bidders no longer stand on a basis of equality and the advantages of competition are lost."

"It must be conceded that the amount of the deposit involved in the present case is not large and that the dispute is only between Sternin and the township. But the statute evinces a clear intention to provide maximum protection for the taxpayer.

"So the principle at stake looms large in the regulation of practices pertaining to the award of contracts which make necessary the expenditure of public money. * * * Frequently the security demanded is in a substantial amount. Manifestly, if an aspirant for the contract knew that it would not be required of him his competitive position would be improved over those vying with him."

Hospital rewiring

(Continued from page 27)

At the end of the building nearest the power source, engineers used two-inch galvanized rigid conduit. The size reduced as the wiring continued toward the opposite end of the building.

Conduit used to lead from the main conduit outside to the rooms was one-half inch galvanized. Wiring was used on both sides of the building, so that entrance could be made into all without entering the individual rooms.

The outside conduit is not unsightly, because shrubbery grows around the building, and this hides the installation. In occasional spots where there is no shrubbery, Administrator Horton has had shrubbery set. One such spot was the site of the switch box. Within another year, this, too, will be hidden by shrubbery.

With all rooms thus wired from the outside, it was possible thereafter for hospital workmen to install and connect the individual air conditioning units as the movement of patients in and out of the various rooms permitted. When a patient was discharged from a room without air conditioning, the workmen then installed the unit before the room was assigned to another patient. With wiring already in place, this operation was but a matter of a comparatively few minutes.

"In view of the fact that there are many hospitals without air conditioning, and which eventually must be wired for conditioning, we feel that this installation might be of practical interest to electrical people, particularly in the South," Mr. Froelich says. "The outstanding features, insofar as the hospital administrator was concerned, were the low cost, and the installation without taking badly-needed rooms out of service or disturbing patients."

Maintenance service

(Continued from page 55)

trained men. Three of the men in my crew can estimate. Our truck fleet is also pointed out as efficient and completely equipped for any job."

The fleet consists of one line truck, one large float, and four smaller trucks, all completely equipped. Another equipped truck never leaves Hot Springs, serving customers for house wiring and repairs.

When Anderson was asked if all of his varied operations are profitable, he gave an affirmative answer. Men trained for the type of job in which they specialize makes possible the variety of installation, repair and maintenance service offered.

Anderson usually employs men who have had G.I. training, and then proceeds with his own training. His electricians who do the installing and maintenance work for industrial customers do little else than this. Some of them are alerted to 24-hour service, their telephone numbers being available to customers at any hour of the night. In maintenance work among mines and mills, this emergency service is important.

Anderson stocks cable and poles, and is equipped to do maintenance and repairs for city water and light companies. Even when the utility companies have their own maintenance crews, they call upon him for emergency service that he is able to give because he is equipped to do it and has the trained men for it.

In a section of the country that is growing fast in industrial activities, he anticipates a mounting need for the maintenance service he offers.

Potomac Edison plans

(Continued from page 48)

program was developed by Potomac Edison and cooperating contractors, builders and lending institutions. Introduced publicly last year as Certified Wiring it will continue to be a major part of the

promotional wiring program of the company.

3. The **Medallion Home** promotional plan is a new program being introduced this year. To receive a Medallion Home award, a house must have Certified Wiring and must have electric cooking, electric water heating, planned light for living, and electric house heating. In addition, there must be at least three other major appliances.

The Medallion Home program has the unprecedented backing of over 180 electrical manufacturers throughout the country, in addition to the support given the program by electric utilities.

These three major promotions will be widely publicized through the use of newspaper ads, home shows and fair exhibits. In addition to this local promotion, national advertising will be conducted in leading magazines and on top TV shows.

Contractor campaigns

(Continued from page 29)

nience. An overloaded service may have a short, and fire hazards are always present.

Technical advances indicate more and improved appliances in the near future. We may advice a particular home to be sure to have their service checked before air conditioning is installed. We point out that all the new homes in the area are being built with a minimum size electrical service of 100 amperes.

However, we engage our customer's ear not only with emergency cases. When we are called in to hook up a dryer, or add outlets to a room, or extend wiring into an addition to the house, we make a point of recommending adequate service. Where there is indecision or a future consideration, we make a note of name and address, and in due time call the customer by telephone.

Extra service makes the customer associate your name with competence and sincerity, and after you have given a homeowner reasons for heavying up the service, it is you she will think of, when she is ready for the job. For example, we always vent dryers after hookup so that moisture in the house is reduced. Customers are pleased with this practice. Goodwill is created. We remind them that additional appliances may mean heavying up service.

We recall a household in which there was an open circuit that we had been called upon to correct.

ELECTRICAL ENGINEER-SALES

BS-EE (Power)

Experience-Min. 3 yrs.

Opportunity-Excellent

Location-Southeast

Travel-Limited

Salary-Open

AAA1 Electrical Manufacturer

Submit Resume' Box 733,

ELECTRICAL SOUTH

806 Peachtree Street, N. E.

Atlanta 8, Georgia

The lights had gone off and we were summoned to make repair. This house had a 30 ampere service with a refrigerator, washer, radio and other small appliances in use. The woman mentioned she had been considering a freezer. We recommended that she let us check before installation for wiring adequacy.

One call for heavying up recently came from a customer who remembered that on two occasions we had mentioned this service. She was now having electric heat put into an enclosed porch and called to ask our advice.

It takes only a few minutes to explain. *Adequate* home wiring pays-off, both for the customer and contractor. It spares the customer an emergency and inconvenience.

Architect cooperation

(Continued from page 28)

cuit systems, with teachers drawn from capable ranks. Some inspectors, including Brumbaugh, serve as instructors, with classes open to both union and non-union wiremen. The sole enrollment requirement is that pupils be currently employed in wiring.

In connection with the woes of electrical inspection, Brumbaugh commented: "From an inspection standpoint, and because it costs the electrical contractor time and money and delays his job, I can't see why more don't examine their work more thoroughly or see that the job is complete before requesting final inspection.

"Far too many jobs are turned down because of a trifling omission. We find ground rods driven in, wire looped around, but no ground clamp on," he said.

"Or a contractor will neglect to ground a table-top or built-in range oven unit. In one case, we went out to check a power pole prior to a terrazo grinding job. There was no meter socket in, yet four men had worked on the job.

"On commercial work, #14 wire was used for switchlegs and #12 for feeds, when present requirements call for #12 all the way," Brumbaugh explained.

That alertness on the part of electrical contractors could be a profit-builder as well as an upgrading factor in improving wiring systems, is pointed out by Brumbaugh.

He questioned: "How many times do you pull into a gas station, for example, and see a wire poking out of a pump, a rusty lighting fixture dangling loosely, etc? Each represents an opportunity to sell a rewiring job. In case of a fire, the station operator can ill-afford a prolonged cessation of business.

"Explaining this to the station owner could easily result in a major revamping job for the contractor," he said.

The same thing applies to other commercial establishments which the electrical contractor sees in his daily rounds.

Brumbaugh cites the case of Sarasota high school. A public hue and cry arose when local inspection revealed that classroom wiring had become a fire hazard and that available foot-candles of illumination were ill-suited to pupil needs.

Following the inspection report, rapid action ensued and a major re-wiring contract was performed by a local contractor. Yet an educated guess would be that no contractor was alert to the condition, even though he may have been attending evening classes at the school! "Contractors could have noted the condition and sold the job," said Brumbaugh.

He cites another example where the attention of a manufacturer was focused on the outage danger arising from a single main switch control of a complexity of circuits. As a consequence, there followed a $20,000 job of re-distributing the circuits and installing the required switching and control equipment.

CLASSIFIED

Rates: $10.00 per column inch. Minimum ad accepted one column inch. All ads for the classified section should be in publication office the 20th day of month preceding publication.

FOR SALE

3-500 KVA Line Material transformers V.-13,200-220-440- with 4-2½% taps, below. Never loaded guaranteed. Se. No. -840067-68-69 Box 186, Mt. Pleasant, Tennessee.

Stock purchase plan

(Continued from page 94)

his work, in the handling of materials and equipment. Absenteeism is negligible, turnover is minor.

Our stock is open for purchase only by employees because we feel that only those working for our company should benefit, and only those with a stake in the business can make the company benefit.

Brush
Headquarters for Electric Industrial Trucks

Whatever your needs... brushes for battery chargers, electrical motors, generators, fans, tools, pumps... there's a HELWIG BRUSH engineered for every purpose. Equal in quality and specs to original equipment, HELWIG BRUSHES assure longer brush life... better commutation, less "down time". Write us—or contact our representative for your requirements.

AVAILABLE NOW "RED CARPET" RUSH BRUSH SERVICE.

HELWIG SPEER **HELWIG CO.** CARBON PRODUCTS
2536 N. 30th Street
MILWAUKEE, WISCONSIN

MY HUSBAND IS CROSS BECAUSE HE CANT FIND A RELIABLE ELECTRICAL ESTIMATOR
DON'T NEED THE CRYSTAL BALL FOR THAT ONE... HAVE HIM CALL BRUNNER!

BRUNNER

Professional Electrical Estimators. Complete Estimates, Labor and Material Quantity Surveys, Supervision—Material Purchases!

"We're the Best in Our Estimation!"

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333½ Peachtree St., N. E., Atlanta, Ga. *JA 4-4339*

ELECTRICAL SOUTH
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Atlanta 8, Ga.

April, 1958

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Please send me additional information on items mentioned in this issue of Electrical South. I have listed the key numbers of these items at right.

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Company .....

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City & State .....

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1. ONE PIECE FRAME WITHOUT WELDING MARKS
2. New torsion spring hinge frame opens with touch of finger ...locks fast. Ample room for relamping.
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4. Frame attachments are invisible. Torsion spring frames keep ceiling line flush.

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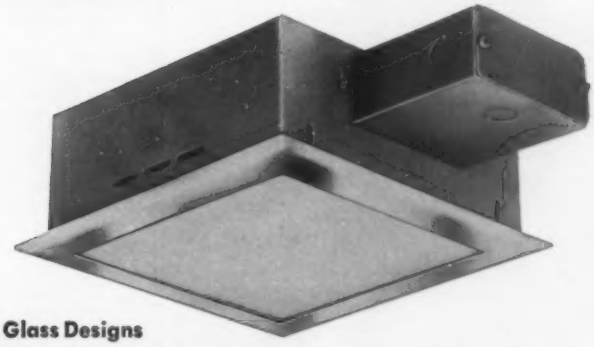
Superior lighting design and construction plus low cost make Atlite the value line in recessed fixtures.



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Seven Finishes—Chrome...Copper...Brass...White...Grey
Satin Aluminum Anodized...Satin Black Anodized

Send for NEW ILLUSTRATED CATALOG of the complete ATLITE line.

ATlite "The Line With Light Appeal"

ATLAS ELECTRIC PRODUCTS CO. 327 Ten Eyck St, Brooklyn 6, N.Y.

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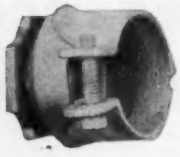

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The BRIDGEPORT FITTINGS INC

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Block and Cooper	Cincinnati, Ohio
Tom Hodges & Co.	Tulsa, Okla.
Tom Hodges & Co.	Kansas City, Kansas
Wm. Bleiman and Co.	Philadelphia, Pa.

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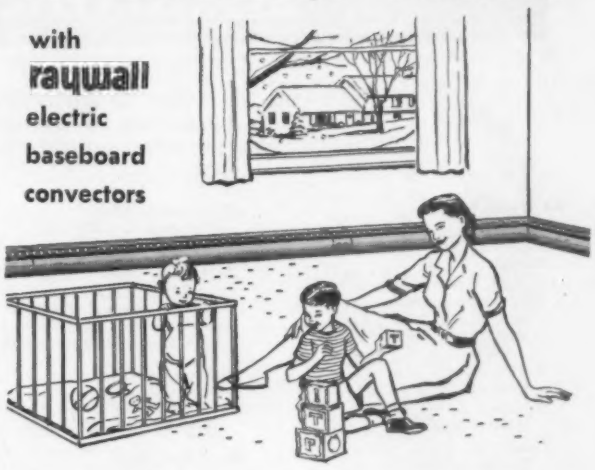

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Edwin F. Guth Co.

El Paso

Elmore & Co., Marshall R.
Frank Adam Elec. Co.
Circle F Mfg. Co.

McCain, J. E.
Helwig Co.

Ft Worth

Musgrove Co., Curtis
Jasper Blackburn Corp.

Houston

Brenner Elec. Sales
Elliott Elec. Prods. Co.

Clinton, Walter L.
Buchanan Elec. Prods. Co.
Edwin F. Guth Co.

Cope & Co., I. E.
Delta Star Elec. Div.

Elliott Co., Lynn
Furnas Elec. Co.

Lamb & Co., A. V.
Electromode Div.

McCray, W. S.
Helwig Co.

Musgrove Co., Curtis C.
Jasper Blackburn Corp.

Peabody Bros.
Murray Mfg. Corp.
Peerless Elec. Co.

Reed, N. O.
Day-Brite Lighting, Inc.

Robertson Co., Elgin B.
Performed Line Prods. Co.

Robertson & Co., Jim
Bridgeport Fittings, Inc.

Snoots Co., Wynne
Revere Elec. Mfg. Co.

Traweek-Healy & Assoc.
Cavalier Corp.

Walters Co., Fred
Carol Cable Co.

Ward Co., L. R.
The Fanner Mfg. Co.

Williamson Sales Co.
T. J. Cope Div.

Wilson Elec. Equip. Co.
Bulldog Elec. Prods. Co.
Allen Bradley Co.

Winkler, B. L.
Frank Adam Elec. Co.
O. Z. Elec. Mfg. Co., Inc.

Lubbock

Norris, Stewart O.
Day-Brite Lighting, Inc.

Snoots, Wynne
Revere Elec. Mfg. Co.

Waco

Musgrove Co., Curtis C.
Jasper Blackburn Corp.

VIRGINIA

Alexandria

Gottemeyer, Warren J.
Thermador Elec. Mfg. Co.

Arlington

Russell, Charles
M & W Elec. Mfg. Co. Inc.

McLean

Dunlop Lighting
Revere Elec. Mfg. Co.
Smithcraft Lighting Div.

Richmond

Crews, L. J.
Briegel Method Tool Co.
Murray Mfg. Corp.
O. Z. Elec. Mfg. Co., Inc.

Ferguson, Lynn W.
Wheeler Reflector Co.

Fishburne, Robert W.
B & C Metal Stamping Co.

Lassisiter Sales Co., W. H.
King Mfg. Co.

Mayo, Jr., Paul
Blackhawk Industries

Roach, Leo A.
Jasper Blackburn Corp.

Rumsey Elec. Co.
Delta Star Elec. Div.

Schraudt, Jr., Geo. E.
Smithcraft Lighting Div.

Sullivan, William J.
Frank Adam Elec. Co.
Circle F Mfg. Co.

Turner, Harris
Edwin F. Guth Co.

Wells, Gordon
Day-Brite Lighting, Inc.

Warwick

Johnson, S. C.
Elliott Elec. Prods. Co.
Slater Elec. & Mfg. Co.

WEST VIRGINIA

Huntington

Muller, Harper & Assoc.
T. J. Cope Div.

SAFETY SWITCHES STAND UP UNDER 100,000 AMPERE SHORT CIRCUIT TEST!

INDEPENDENT TESTING LAB RELEASES FINDINGS AFTER GRUELLING "TORTURE RACK" TESTS

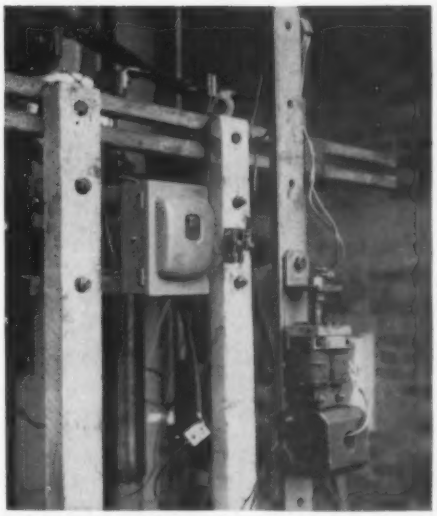
Unprecedented tests have been completed on 30 through 600 ampere rated Square D safety switches equipped with high capacity current limiting fuses. During these tests, switches were closed on a short circuit system delivering up to 100,000 amperes (symmetrical—R.M.S.). In addition, the fault was applied on the closed switches. *All switches withstood the shocks without any sign of failure!*

High Capacity Systems Demand Stamina

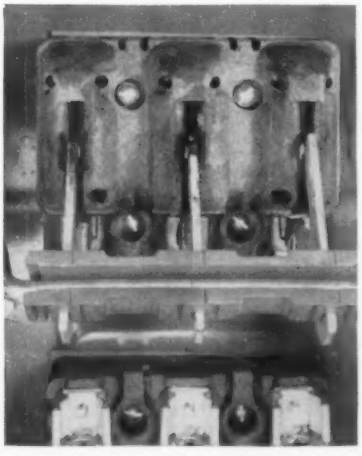
High capacity systems capable of delivering tremendous short circuits are becoming more and more prevalent with the growth of electrical loads. Network systems in metropolitan areas are a source of such faults. Another, the heavy industrial areas, with a concentration of sub-stations and rotating machinery. Terrific stresses and heat generated by such faults are serious hazards to both personnel and equipment unless properly contained. That is why proven protection for switching service and feeder circuits is of major concern.

Square D Standard Switches Do The Job

These tests offer conclusive proof that standard Square D Type HD and Type ND switches, equipped with high capacity current limiting fuses, can be used on such systems without fear of failure. You pay no premium for the proven performance they offer. Why settle for less?



Square D switch on "torture rack" during test involving up to 100,000 ampere short circuit



SUMMARY TABLE • Extract from Report No. 5/NA R66—Sheet No. 5

Ampere Rating	Voltage Rating	Catalog Number	Average Symmetrical Prospective Current R.M.S.	Recovery Voltage R.M.S.	Maximum Total Arcing Time	Fuse Type
30	250	A85351	96,600	252	.0009	A2Y-30A
30	250	A85351	96,400	253	.0010	FRN-30A
30	600	A85341	107,000	590	.0020	A6Y-30A
30	600	A85341	106,000	601	.0027	FRS-30A
60	250	A86352	96,400	248	.0010	A2Y-60A
60	250	A86352	95,200	252	.0019	FRN-60A
60	600	A86342	106,000	605	.0011	A6Y-60A
60	600	A86342	108,000	598	.0020	FRS-60A
60	600	A86342	107,000	601	.0013	NAS-60A
100	250	A86353	95,200	253	.0009	A2Y-100A
100	600	A86343	108,000	604	.0014	A6Y-100A
200	250	A86354	95,200	253	.0037	A2Y-200A
200	600	A86344	107,000	602	.0011	A6Y-200A
400	250	A86355	95,900	252	.0039	A2Y-400A
400	600	A86345	106,000	611	.0050	A6Y-400A
600	250	A86356	94,500	251	.0062	A2Y-600A
600	600	A86346	107,000	601	.0062	A6Y-600A

Above • Extract of Nelson High Power Laboratory Report C/NA-66

At left • No sign of failure in this switch interior after 100,000 ampere short circuit test

SQUARE D SAFETY SWITCHES GIVE YOU *Certified* PERFORMANCE!

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT...NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

Announcing

another outstanding development soon to be available by the makers of BUSS FUSES

FUSETRON

LOW-PEAK

FUSES

Have CURRENT LIMITING added to High Interrupting Capacity and Long Time-Lag

FUSETRON Low-Peak Fuses are made in all standard sizes above 60 amperes—both 250 and 600 volt ranges.

In 60 amperes and smaller sizes tests show that FUSETRON duel-element fuses have sufficient current limitation to protect circuit and components in all normal cases.

Now you can have a high degree of protection against the thermal and mechanical stresses that heavy fault currents often impose on switches or other circuit components.

FUSETRON Low-Peak Fuses have a current limiting element that cuts off fault current so fast that it cannot build up to a damaging peak.

These new FUSETRON Low-Peak Fuses are built on the same principle as FUSETRON dual-element Fuses. They have:

the same High Interrupting Capacity

the same Time-Lag to hold harmless current surges

PLUS Greater Current Limitation to restrict fault currents to a LOW PEAK

FUSETRON Low-Peak Fuses can be interchanged with FUSETRON dual-element Fuses.

Where their use is required in any part of the electrical system, they can be installed without upsetting proper coordination over the range of useful loads and normal faults.

Hence, their application requires no testing or complicated calculations.

They are designed for use to protect circuits and components that might be damaged by the thermal and mechanical stresses of peak fault currents if other protective devices are used.

If planning new installations, keep FUSETRON Low-Peak Fuses in mind for those locations where peak fault current must be held to a low value.

BUSSMANN MFG. DIVISION

UNIVERSITY AT JEFFERSON, ST. LOUIS 7, MO.

McGRAW EDISON